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MANAGEMENT MATTERS

Linking management of buildings to environmental impacts in a pilot study of supermarket buildings

Örjan Lundberg
Environmental Systems Analysis
Energy and Environment
CHALMERS UNIVERSITY OF TECHNOLOGY
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Written by Örjan Lundberg

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CHALMERS UNIVERSITY OF TECHNOLOGY
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SUMMARY

This report is based on a pilot study about how the environment is affected by the management of supermarket buildings and provides some ideas answering that complex question. It also suggests models on how such results can be illustrated. The study regards two buildings used as supermarkets, the building structures are similar but the management strategies differed.

Buildings used for supermarkets are complex buildings. They are technologically advanced and many different stakeholders have interest in the buildings. The management of such a building is technically more demanding than a regular building, like an office or a residential building. The management of these buildings is also complex in the sense that different sections of building could be managed by different companies and that many specialists are needed to service much of the equipment in the buildings.

Different buildings are managed in different ways. The main differences are if the company that owns the building also occupies the building and if the management staff is employed by the company that owns the building or not. This is a form of outsourcing. The outsourcing created a management environment with more actors in the network that is managing the building. With more actors, there are also more relations between the actors, more contracts and more stakeholders with different interests.

This study is based on the EAO (Environmental Assessment of Organising) framework developed by Baumann. The framework suggests that there is a link between how the operation of products is managed and the operation's environmental performance. The operation in this pilot study is the running of buildings used as supermarkets. The results from the study show that there are differences in the management strategies between different buildings, even though the supermarkets were part of the same chain. These differences in management could in some cases lead to differing environmental performances. The instances when management affects environmental performance can be discussed in terms of *interactions* between the management and the environment. This report holds several examples; one is basic and deals with the issue of lighting. When a light fitting is mounted there is an option whether it should be a low energy consuming or a conventional one. The choice might seem easy at a first glance but the choice is complex since there are numerous actors with different opinions involved in such a decision. For example, is it the actor that is paying the energy bill that is paying the additional cost for the energy efficient lights?

The purpose of the pilot study was to test the EAO ideas in a real setting, to examine the relationship between environmental performance and management of the buildings in detail and also to develop methodology to conduct this type of research.

The findings from this pilot are that there is a relationship between the environmental performance of a building and the way that it is managed. However, to be able to quantify and qualify that relationship, some modifications to the research design are necessary. The relationship between the management of the building and its environmental performance is illustrated in two models in this report. The models are based on the idea that there are two environments, the organizational environment and the natural environment, previously referred to as management and environment. The idea is that there are chains of actions occurring in these

two environments. For example a certain pollutant is emitted in the natural environment triggers a number of actions in this environment, for example a type of species might die, and the extinction of this species causes another species to struggle for food and so on. Similarly in the organizational environment, a certain event will make certain staff member to react. Using the example of the lights again, when a light goes out a staff member in the supermarket will report the broken light to the person responsible for the upkeep of the building, then they will report that to the maintenance personnel, who then will change the light. Depending on what other people in this chain have decided they will replace the broken light with the appropriate light fitting. The model illustrates how these two environments interact.

Several interactions between the two environments are presented in a short story format in this report. The stories are snapshots of management of buildings, they are chosen to illustrate how things that might seem as straightforward maintenance, have complex organizational networks attached to them. The organizational networks are determining how tasks are carried out in the buildings. The stories connect the environment with the organizational networks.

The second model shows the complexity of the management of a single appliance in a supermarket. It shows the number of actors and their influence in an interesting way. One of the recommendations for future studies is to focus on one or two appliances in the building rather than on the entire building. The reason for this recommendation is that the management of a building used as a supermarket is very complex and to measure its environmental performance is a very large task in itself. If one or two appliances were studied the extent of data would be less and the environmental performance would be easier to measure, as a consequence of this, the relation between the management of the product and its environmental impact will be clearer and easier to understand.

The link between the two environments are established further in this report, Brunklaus (2005) established the link in her licentiate thesis. This link is interesting and this pilot demonstrates the need for further investigation to the issue with modified investigation methods. This report is also suggesting that participant observations would be useful a tool in this research field, also in future studies.

SAMMANFATTNING PÅ SVENSKA

En pilotstudie om hur miljöpåverkan kan kopplas till organisering av förvaltning av byggnader presenteras i den här rapporten. Rapporten är en baserad på en pilotstudie. Studien handlar dels om att länka samman organisering av förvaltning med miljöpåverkan, men också om att prova metoder för att studera den länken. Rapporten behandlar en studie av ICA butiker, Maxi och Kvantum. Butiksbyggnaderna som studerades ingår i två olika organiseringsnätverk. I det ena nätverket ägs byggnaderna av ICAs fastighetsföretag ICA Fastigheter, i det andra av fastighetsbolaget AP-fastigheter. Förvaltningen av byggnaderna är alltså strategiskt olika organiserad, butiksbyggnaderna i studien har dock mycket lika egenskaper.

De studerade byggnaderna är komplexa med avancerad teknologi och varierad användning av flera olika användargrupper. Förvaltningen av dessa byggnader är därför också komplex. Organiseringen av förvaltningen visade sig också vara komplex, många aktörer var inblandade i förvaltningen på olika sätt med olika intressen och insatser. Många specialister var inblandade i förvaltningen, de gjorde sin specialitet och tillsammans fick alla specialisterna byggnaderna att fungera. Ett övergripande holistiskt arbetssätt är ofta rekommenderat för att förverkliga miljöarbete och energibesparingar, de effekterna var svåra att åstadkomma på grund av de många inblandade aktörerna.

Pilotstudien är baserad på Baumanns koncept Environmental Assessment of Organising EAO, översatt miljöbedömning av organisering. Ett av syftena med pilotstudien var att pröva konceptet i en empirisk fältstudie. Baumanns koncept bygger på tanken att hur organiseringen av produkter eller tjänster påverkar deras miljöpåverkan. Hon ger exemplet om fastighetsförvaltning i sin konceptbeskrivning, två byggnader som byggdes för till exempel hundra år sedan, som var identiska då kan se mycket olika ut i dag. Deras miljöpåverkan borde också vara olika då, resonerar Baumann.

Forskningen inom ramen för pilotstudien gjordes i form av intervjuer, dokumentanalys och observationer. Observationerna gjordes på plats i butikerna, service teknikernas förvaltningsarbete och interaktion med apparaterna i butikerna studerades. Rapporten innehåller ett antal episoder från fältstudierna, de är återgivna som korta observationer och beskriver en handling, hur den gick till, ett försök till förklaring till varför den skedde och vad som initierade den. En koppling till hur händelsen är relevant för miljön ges också i varje episod. Ett exempel på en av episoderna handlar om tomater och lampor. En kortare redogörelse för episoden presenteras här.

I en av de studerade butikerna skulle en servicetekniker byta en spotlight i grönskasavdelningen av butiken. Spotlighten visade sig vara mycket stark, 100W. Det fanns många likadana lampor i taket på den avdelningen. Spotlighten var riktade mot grönsakerna och speciellt framtagna för att ge grönsakerna aptitlighet och se fräsha ut, kort och gott så skulle deras sken göra ett flertal tomater kan säljas. Lamporna var uppenbara energislukare och verkligen överdimensionerade eftersom det fanns tillräcklig belysning i avdelningen utan spotlighten. En stor energibesparing skulle kunna åstadkommas och en ekonomisk kalkyl med mycket kort återbetalningstid skulle kunna ställas upp för att lamporna skulle kunna bytas eller helt enkelt tas ner. Ekonomisk återbetalning används ofta som argument för att motivera energibesparingar. I det här fallet skulle inte det fungera eftersom butiksinnehavaren inte skulle bli påverkad av den ekonomiska

kalkylen på grund av att tomatförsäljningen troligtvis skulle gå ned och på så sätt skulle nettoförtjänsten på att ta bort eller byta lamporna inte ske. Den här typen av lampor var testade av ICA och fanns lättillgängliga för de butiker som vill installera dem. Miljörelevansen i den här episoden är den höga och tillsynes onödiga energiförbrukningen. Strategi och arbetssätt relevansen är att ICA rekommenderar lamporna, interaktionspunkten är när serviceteknikern installerar lamporna.

Organiseringen av förvaltning av butiksbyggnader kanske inte direkt kan kopplas till byggnaders miljöpåverkan, men efter en stunds tankemöda kan flertalet sådana relationer identifieras. Jag kallar dem interaktioner och syftar på interaktioner mellan organiseringen av förvaltningen och naturmiljön. Rapporten utvecklar interaktionskonceptet i större djup, men några exempel och en kortare beskrivning av dem är på sin plats även här. Organiseringen av förvaltningen av byggnaderna kan ses som ett nätverk där många aktörer och fysiska enheter samspelar, exempelvis, fastighetsförvaltare, servicetekniker, fläktar, kylmedia, energibränslen, pengar osv. Naturmiljön kan också ses som ett nätverk på liknande sätt, men med aningen annorlunda aktörer och artefakter, exempelvis koldioxid, ozonlager, fiskdöd, global uppvärmning, ökenutbredning osv. När dessa två nätverk interagerar kan de kallas interaktioner, exempelvis när en servicetekniker minskar drifttiden på fläktanläggningen i en butik, minskar energianvändningen, vilket minskar behovet av förbränning av bränslen för energiframställning, som i sin tur minskar emissionerna av bland annat koldioxid. Här är interaktionspunkten mellan de två nätverken. Koldioxid är nämligen en växthusgas nära kopplad till växthuseffekten, om mindre koldioxid släpps ut, bromsas klimatförändringarna som kommer till följd av växthuseffekten. Klimatförändringar har stora miljöpåverkningar i form av bland annat förändrade ekosystem, ökenutbredning och extremväder. På detta sätt interagerar de två nätverken.

De är just dessa interaktionspunkter som är intressanta att studera i de olika nätverken. Genom att studera hur fastighetsförvaltningen av butikslokaler kan förståelse för hur ena sidan om interaktionspunkten fungerar skapas. Det är denna sidan som vi vet minsta om. Den naturvetenskapliga miljösidan är relativt väldokumenterad, framförallt är interaktionspunkterna och hur interaktionerna skapas utforsade.

Den här pilotstudien behandlar hur två olika förvaltningsstrategier implementeras och fungerar i butikslokaler för att skapa förståelse och kunskap om hur val av strategi och arbetssätt i förlängningen kan påverka miljön. I förlängningen skulle studier av den här typen kunna bidra till att identifiera arbetsmetoder och strategier som påverkar miljön på ett skonsammare sätt än andra.

Resultatet från studien är att det finns en koppling mellan strategival och arbetssätt och de förvaltade byggnadernas miljöpåverkan, men att kvantifiera den kopplingen är inte möjligt inom ramen för den här pilotstudien. Lärprocessen inom ramen för projektet visar att några modifieringar till fältstudiedesignen och urvalet eventuellt skulle förenkla arbetet att finna slutsatser som kan kvantifiera sambandet. Inom ramen för pilotstudien har också två modeller för att illustrera interaktionspunkterna och sambanden för organisering inom de komplexa organiseringsformerna som tillämpas inom fastighetsförvaltning. Kopplingen mellan organisering av förvaltning och dess påverkan på naturmiljön är starkt i den här rapporten.

Ytterligare resultat från studien är att de metoder som användes för att studera den här typen av problematik är användbar och kan med fördel användas igen i liknanden fortsättningsstudier.

Framförallt var den unika datan från observationerna värdefulla, de gav en insikt i det dagliga förvaltningsarbetet som inte hade varit möjlig genom endast intervjuer, eller dokumentanalyser.

Vidare finns det värde i de episoder som presenteras i rapporten, de kan användas som utgångspunkter för strategiska miljöåtgärder inom arbetssätt. Det finns flera exempel på hur miljöpåverkan skulle kunna minskas och förvaltningsarbetet bli enklare genom relativt små åtgärder. Med det sagt finns det inga garantier att det som verkar uppenbart som den logiska och rationella åtgärden är den bästa eller ens bra. Resultaten från studien visar att förvaltningen är komplext organiserad med många olika aktörer inblandade och risken för många suboptimeringar eftersom den övergripande bilden av nätverken och vad som vore den bästa åtgärden blir svår att tillgodogöra sig.

PREFACE

This report presents a pilot study. The pilot is developed to investigate how management could impact the environment and how this can be studied. The idea stems from an article written by Baumann (2004), which calls for research within a framework she calls Environmental Assessment of Organising (EAO). The idea in her call for work is that the environmental impact depends on the way production or services are managed as well as the technical aspects of the production. Baumann exemplifies by using the house she resides in, she compares it to the neighbouring one and reflects on the differences between the buildings. They seem to be built in the same style, but have changed into buildings with different attributes and with different environmental features, e.g. insulation and triple-glazed windows. Baumann suggests that these changes depend on how the management of the buildings have been organised.

This pilot is one of the first studies as a response to this call for research. Previously Brunklaus has worked in this field, but focused on residential buildings and with a different inquiry approach than this project. She started her investigation in the technical apparatus in the buildings and approached the organisation from that starting point. I started in the organisations and approached the technical entities from that starting position. The studies are also differentiated by the difference in physical study object. This pilot is focused on buildings used for supermarkets, Brunklaus investigated residential buildings. It may seem as two rather similar objects, but the markets they operate in and the strategies they use for management of the buildings are quite different. There are more actors involved in the management of a supermarket facility than in a residential building and the buildings are more technically advanced. Another difference is that the state controls the rents in the residential property market. The rents in the commercial property market are not controlled. These differences cause dissimilarities in the management strategies and the incentives situations in the two markets. However mine and Brunklaus study have several characteristics in common, they are complements to each other rather than competing explanations. This is a contribution to the same body of theory.

I would like to thank all the people I came in contact with at ICA, YIT, AP Fastigheter and Wira during the observations and the interviews, I thank you for letting me spend some of your working days with you and also because you all were willing to share your knowledge and experiences with me. Second thank is to my academic supervisor Henrikke Baumann, thanks for guidance, advice and for being open-minded, also Professor Sverker Molander, for facilitating a workshop that was crucial to the completion to this project. Emma Rex and Birgit Brunklaus were essential discussion partners during our ORM reading seminar series. Johan Erlandsson was an invaluable “bollplank” and passionate environmentalist throughout the project. Third thank is to the Institute for Sustainable futures at University of technology, Sydney for allowing me to use their office space while writing this report and presenting my ideas along the way. Additional thanks to the people at the institute who all were very welcoming and inspiring.

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PART I - INTRODUCTION

Buildings affect the environment in several different ways. Heating, cooling and electricity usages in buildings are energy consuming activities and production of energy has in most cases negative impact on the environment. Buildings also consume water, building material and generate waste. These activities contribute to different environmental problems such as global warming, eutrophication, acidification and resource depletion. Buildings can be used for many different purposes. This study is focused on existing buildings used as supermarkets. They are a special case of buildings; however they are relevant to study since they represent the complexity of the management of the buildings in a good way.

The property sector is a large contributor to society's total environmental impact; technology and ways of improving the sector's performance exists, these are however not used. The existing buildings are important contributors to the environmental impact. The ways the decisions are being made and how the people working with the buildings are acting have impact on the environmental performance of buildings. Studying the management strategies impact in buildings' environmental performance is both relevant and important. Environmental performance of buildings changes over time as buildings constantly are changing. Stewart Brand (1994) wrote "Nobody builds a building, they just start one". These changes happen for many different reasons, ranging from new ownership and new legislation to trends and economic factors. Birgit Brunklaus (2005) compared four residential buildings, which were almost identical when first constructed, but over time for various reasons have been changed differently and now have divergent environmental impact. Brunklaus (2005) showed that the different management strategies used in the buildings contributed to the differences in the environmental performance of the buildings.

The studied buildings house ICA stores. ICA is Sweden's largest distributor of daily grocery, with approximately 2 300 stores in Sweden and Norway. ICA is the largest actor on the market with twice as large market share as their closest competitor. They have a range of different sizes of shops, from small and medium sized neighbourhood shops to larger supermarkets (ICA 2005). The ICA group also include companies with other activities i.e. a bank, a restaurant supplier and a property management company ICA Fastigheter. The latter is the company that this case study will focus on.

ICA Fastigheter's main activity is building, managing and developing shops for ICA. They are involved in the entire process from land acquisition to construction and as owners of shops. The maintenance of the shops is however outsourced. When the shops are built and ready for use, they are leased to more or less independent ICA stores. The ICA stores are then tenants and ICA Fastigheter is landlord. However ICA Fastigheter does not own all of the properties that they lease to their tenants. Some of the properties that they are leasing are owned by investment companies and leased back to ICA Fastigheter who then leases the property to an ICA store.

The ICA case is a good representation of how different management strategies have been chosen to perform the same task, manage buildings used as supermarkets. The buildings are rather similar physically and the way they are used is also very similar. This case gives me the opportunity to investigate how the organisational differences influence the environmental performance of these buildings.

The case study ICA Fastigheter compares two stores, one owned by ICA Fastigheter and one owned by an investment company and then leased back by ICA Fastigheter and then leased again to the ICA store. I have described these relationships in my previous conference publication (Lundberg and Baumann 2005). That paper describes the possible obstacles, implications and opportunities for progress in environmental work with the two different ownership strategies. It is also discussing how an outsourced maintenance organisation can affect the environmental performance of buildings. This pilot study provides more empirical data for theories presented in the conference article.

1.1 SCOPE & PURPOSE

The purpose of this report is (i) to give examples of how management strategies can affect the environmental performance of buildings and (ii) to explore how methods and tools for qualitative research can be used when the building management and environmental assessment field are combined.

Two different management strategies are studied, several buildings are included. The study was first intended to compare two buildings to each other; the study was however transformed to focus on two different management strategies. The strategies are not compared; they are used to illustrate how building management strategies can influence the environmental performance of buildings.

1.2 QUALITATIVE RESEARCH METHODOLOGY

Not everything that can be counted counts and not everything that counts can be counted

Albert Einstein

Qualitative research is research that produces findings that not are statistical or quantified (Strauss and Corbin 1990). The research tools in qualitative research generally include either one or several of interviews, observations and document analysis (Patton 2002). The research can for example be about behaviour and culture in organisations or social movements. One of the advantages of qualitative research is the increased possibility for deeper understanding of complex problems and phenomenon. Strauss and Corbin (1990) explain further that qualitative research methods are useful when researching what lies behind phenomenon, where little yet is known, it can also be useful in fields where more is known to give a new perspective on the situation. Results from a qualitative research can give details about the topic that are difficult to get in a quantitative ditto. Charmaz (2006) explains that another advantage of using qualitative research methods is that the study can be expanded or modified while the study is being done, this means that interesting patterns, paradoxes and relations that emerge during the study can be researched in detail within the current study.

The methodology used in this case includes, interviews and observations as well as document analysis. I interviewed key persons in the organisation and observed maintenance personnel, using a method called participant observation. In addition to that, I analyse the property owners' environmental documentation.

1.2.1 INTERVIEWS

The interviews were semi-structured and recorded either on tape or by note taking. Kvale (1997) suggests that open-ended questions are useful to provide fuller and more in-depth answers. I based my interviews on open-ended questions, in most cases with a number of follow-up questions. I used closed end questions in the cases when I needed clarification of something said in the answer to an open-ended question. Throughout the interviews I aimed to make the interviews take the form of a conversation rather than a formal research interview. Goodrick (2007) advises the researcher to be comfortable with silences in the interviews, I kept this in mind during the interviews and it proved to be a very useful and effective advice. I documented the data collected from the interviews by shortly after the interviews writing a document containing the main topics and findings, also my impressions and thoughts were documented. I transcribed the interviews that I recorded at a later stage as recommended by Kvale (1997).

I aimed to develop my own interviewing style during the weeks when I did the interviews and my interviewing style changed from having more prepared notes to less when I understood more about the topic that I was conversing about with the interviewee. I gathered valuable data through the interviews. They gave me the opportunity to ask questions and converse with key people in the organisations, their uninterrupted attention was given to our conversation on the topics that I suggested and through the semi structured questions I had prepared.

The interviews were approximately one hour long and were conducted at the interviewees' offices, one of the interviews were done using the telephone. I interviewed 9 persons in total. The interviewees worked in facility management and all held management positions. The majority of them held middle management positions. One senior manager was interviewed.

1.2.2 PARTICIPANT OBSERVATION

Participant observation methodology originates from anthropology and ethnography; it has been used in these fields for a long time, more about its creation later. I will first describe what it actually is. I will start by using the Harvard University anthropologist Florence Kluckhohn's definition from 1940:

Participant observation is conscious and systematic sharing, in so far as circumstances permit, in the life-activities and, on occasion, in the interests and affects of a group of persons. Its purpose is to obtain data about behaviour through direct contact and in terms of specific situations in which the distortion that results from the investigator's being an outside agent is reduced to a minimum (Kluckhohn 1940)

The anthropologists DeWalt and DeWalt (2002) describes the methodology in their guide for fieldworkers as:

Participant observation is the process enabling researchers to learn about the activities of the people under study in the natural setting through observing and participating in those activities

Barbara Kawulich (2005) gives a pragmatic description of what a participatory study really involves:

The process of conducting this type of field work involves gaining entry into the community, selecting gatekeepers and key informants, participating in as many different activities as are

allowable by the community members, clarifying one's findings through member checks, formal interviews, and formal conversations, and keeping organized structured field notes to facilitate the development of a narrative that explains various cultural aspects to the reader

My study involves all the aspects Kawulich describes and the methodology and design of my study is based on the definitions above. As mentioned above, this methodology originates from ethnography and anthropology, hence most studies have been done in these disciplines. However an interest for the methodology has existed in studies of organisations for some time. Vinten (1994) mentions former General Motors CEO Alfred P. Sloan's 1963 book *My years at General Motors* as the first participant observation study of an organisation and gives a few more examples of such studies. Deal and Kennedy (1982) explains the similarities between companies and communities in the sense that they both have certain culture, behaviours, traditions, history and attitudes. Vinten (1994) draws on these similarities when he proposes opportunities for participant observation studies of organizations.

Another distinction in the design of a participant observation study is whether to conduct the study covert or overt. I decided to make sure everyone I studied was aware that I conducted research and that research was my main interest in my dealings with them. Also since I conducted the study as a first pilot case and under a shorter period, it would have been practically impossible to conduct the study without telling the informants about some of my intentions. So the study I conducted was more precisely defined an *overt participant observation* study. A covert ditto would be the opposite, i.e. conducting the study without telling anyone about it.

The researcher is faced with numerous situations when conducting this type of studies, where he or she has to make a decision about how to act in that particular situation. Buford Junker (1952) defined four different roles for the researcher conducting participatory observation, Raymond Gold (1958) expands on the four roles in a paper that is frequently cited in literature about Participant observation methodology. The roles have different levels of interaction with the informants and also a different level of risk of getting too involved with the informants. Gold uses the term "going native" for describing getting too involved with the informants and losing objectivity. However it is important to note that, the more the researcher interacts with its informants the more data will be collected and the reliability of the data is improving. Figure 1 illustrates how the risk of "going native" increases with the level of interaction with the informants and access to data. The roles range from the extreme Complete participant, where the researcher not reveals that research is being conducted; Gold gives the example of the researcher taking a job in a factory to study inner-workings in informal groups. When the researcher takes the participant as observer role are the informants aware of that research is being conducted. Gold explains that this role is most commonly used in studies of communities and under longer stays. The researcher can do formal interviews but has also the freedom of observing without interacting at times. The observer as participant is similar but is a less in-depth role, mostly used in shorter studies, such as one-off interviews. The relationship with the informant is brief, hence risks for misinterpretations increases. The role as the Complete observer is used when the researcher is completely removed from interaction with the informants, this role involves no interaction and is characterised by systematic eavesdropping.

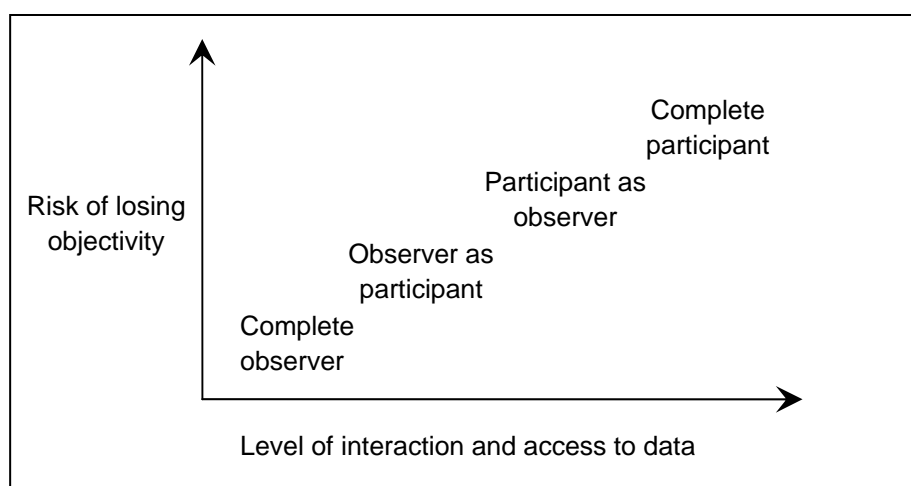


FIGURE 1 GOLD (1958) DEFINES FOUR ROLES A RESEARCHER CAN TAKE DURING PARTICIPANT OBSERVATION FIELD STUDIES. I HAVE ARRANGED THEM IN THE DIAGRAM RELEVANT TO EACH OTHER'S CHARACTER WHEN IT COMES TO ACCESS TO DATA AND THE RISK OF LOSING OBJECTIVITY.

Jackson (1983) explains that the participant as observer and observer as participant often are used in combination with each other in studies. I decided to follow Jackson's suggestion and combine the two middle roles. I did not spend enough time in the field to consider my role as true participant as observer, however did I spend more time than the one off meeting's that Gold describes the Observer as participant role as being suitable for. I did my field studies during three working days with the maintenance staff, divided to two different teams.

1.2.2.1 The origin of the Participant observation methodology

The participant observation originates from the late 19th century anthropological studies carried out by Frank Hamilton Cushing, studying the Zuni Indians between 1879 and 1884 (Cushing and Green 1979). Cushing was the first anthropologist that managed to be accepted as a member of the studied community. Cushing studied the Zuni people, their culture and behaviour from their own perspective, not from his western perspective. Another pioneer was Beatrice Potter Webb; she took a job as a rent collector in a poor neighbourhood to be able to interact with the people in the neighbourhood. As a second part of her study did she take a job as a seamstress in a sweatshop to understand her study objects' situation better (Kawulich 2005).

Cushing and Webb were the pioneers, but it was from the writings by the Polish anthropologist Bronislaw Malinowski's field trip to Papua, to study the Trobriand Islanders' monetary system, that the methodology was established. Malinowski engaged with his study objects, learned their language and participated in their society, while doing this he conducted his study and at the same time did he also develop theory about participant observation (Young 2004). Malinowski's writings, while back at the London School of Economics revolutionized modern anthropology. The participant observation methodology is now well known, accepted and is often the preferred methodology of anthropologists.

1.2.3 REFLECTING ON QUALITY AND VALIDITY OF MY QUALITATIVE RESEARCH

Patton (2002) points out that in qualitative research the researcher is the instrument used for the data collection, whereas in quantitative research tools such as surveys are used to collect the required data. Patton means that the quality and the validity in a qualitative study are subject to the skills, competence and rigour of the person doing the research rather than how well surveys are constructed. Charmaz (2006) suggests on the same topic that:

“A keen eye, open mind, discerning ear and steady hand can bring you close to what you are studying and is more important than developing methodological tools”.

Charmaz (2006) also writes that the quality of the qualitative study depends on the quality of the data collected. She argues that the more data the researcher collects the more thorough the understanding of the studied field will be. Charmaz criticises Glaser (1998) and Stern (1994), who are arguing that studies with smaller data collection also have their place. Charmaz refers to Glaser and Stern’s suggestions as smash and grab data collection. The data sample in my study about the management of supermarkets includes interviews with 9 key persons in management positions and three days of participant observation of maintenance personnel. I guess Charmaz would call my method a smash and grab data collection, but that I might get some support from Glaser and Stern.

The skills of the researcher are discussed by Strauss and Corbin (1990) when they refer to Glaser (1978) on the topic they call theoretical sensitivity. The researcher’s ability to pick up details and subtleties in data depends on his or her previous readings and experience with or relevant to the studied field. Strauss and Corbin describe three different sources for theoretical sensitivity. Firstly, literature, by being familiar with the area that is researched, the researcher can understand concepts and relations more easily during the research in the field. Secondly, professional experiences related to the studied field will assist the researcher in understanding how things work in that particular field. Previous experience can however block the researcher from seeing things that have become routine. The third source for theoretical sensitivity is personal experience. The experiences the researcher has obtained in private settings might assist in picking up expressions and assist in relating to the informants.

When reflecting on myself and my field work in the study, I have a good knowledge of the literature in relation to the area studied. I studied the technical concepts of buildings, during my civil engineering studies. I expanded my knowledge through relevant literature to include the literature about the property sector and management strategies, when writing the report The property sector and the environment (Lundberg 2007). I felt that the knowledge from literature did assist me in the field studies, especially during the interviews with management persons. With regards to professional experience, I worked a maintenance job for some time; the job was in a similar but different field. This experience was useful to me for understanding jargon and social rules in a male dominated workplace. Thirdly, my personal experience was used in establishing good relations to the informants. I was familiar with some of the informants’ hobbies, which assisted me in creating an open and sharing atmosphere during the field observations.

1.3 RESEARCH DESIGN

The research was initially designed to be a comparative study between two supermarkets. I believed that it would be possible to extract differences in their management styles, cultures and policies, and that these differences then could be mapped on to the differing environmental

performance of the supermarkets. The research design is based on this idea, however the design was modified when I realised the immense task that the above involves. What I set out to do in the initial stage was not possible within the realms of a pilot study.

The design of the study was changed to include more supermarkets, but in less depth. The organisations governing the physical building structures in the supermarkets worked with several shops and had responsibilities that covered many shops. By including more shops I was given more data in shorter time in the field. However the comparison between the shops was not possible to do, some comparisons between the different organisations are however still possible.

The modified research design gave me the opportunity to access a lot of data in limited time, just what I wanted to do in a pilot study. I changed the research design along the way, since it was a pilot study and I did not have the correct idea about how the supermarkets were managed.

1.4 FIELD WORK

The field work involved interviews with 9 key persons in the management of the supermarkets; they were managers; executive managers as well as middle management. I also conducted three (3) days of participant observation with maintenance personnel in different supermarkets. 2 days in one network and 1 day in the other network.

The tangible results of the field work are recorded interviews, extensive note taking while conducting the observation, some photography and policy documentation. The intangible results are impressions and understandings created in my mind. This case study report is a step to combine the intangible with the tangible findings and produce a tangible item of research findings.

1.5 METHODS FOR DOCUMENTATION AND ANALYSIS

The interviews were recorded and later transcribed. The observations were documented by continuous note taking and through some photographing. I wrote two types of notes during my observations. The first were documentary while the other was more of a reflective character. The reflective notes were written during shorter breaks and when each of the observations was finished. In addition I wrote short reflections on the impressions from interviews.

The data was analysed by repetitive reading and listening. I noted down themes and phenomenon mentioned frequently, I connected issues that appeared in different documentation, I was also interested in finding paradoxes in the data. I decided to not use the colour coding and systematic memo writing, that often is recommended in for example literature on grounded theory methodology. My decision was mainly based on the quantity of data that I gathered. I had a smaller data set than what the studies that are referred to in such literature, I felt that it was comprehensible to analyse my less extensive amount of data without using the formalised systematic tools.

The models used in the revisitation of the field observations were developed based on the readings and discussion that took place within the framework of a reading seminar series and was solidified in a workshop session with my academic colleagues, acknowledged in the preface. The workshop was facilitated but similar to a brainstorm; however it included criticism of the concepts that were developed during the session. It was an outcome oriented creative process that

was successful in creating a base for the further development of the models that I present in the later sections of this report. I applied my field data to the basic frameworks that came out of the workshop. I also developed the models further, which usually is necessary when applying something that previously only been conceptual.

1.6 RESEARCH QUESTIONS

The research questions for this descriptive investigation are:

How is management of large retail buildings done?

How is the natural environment affected by actions in the management of large retail buildings?

How can the relationship between organisational actions and environmental impact be explained and illustrated?

How can qualitative research methods be used to investigate environmental issues related to the management of large buildings?

2 SETTING THE SCENE

Managing a building is a complex task, or at least is the management of a building complex.

This chapter sets the scene for the study about environmental effects from management strategies in buildings. The chapter describes the organisations that are involved in two different strategies to manage retail buildings. There are a number of organisations involved in this process. There is essentially one major difference between the two strategies. In one of them the building is owned by a company which is part of the same commercial group as the tenant, whereas in the other cluster the building is owned by a company that is formally independent of the tenant.

This chapter describes two strategies for managing supermarkets. The intention is not to compare the two strategies in the study, but to use them to illustrate and take examples of how the strategies have impact on the buildings' environmental performance. Examples from several different buildings are included in the study.

2.1 THE COMPANIES INVOLVED

Table 1 gives an overview of the companies involved in the study. I present the companies in more detail in the following. The table also includes the research method I used to collect data about the companies and their operations.

Company	Research method
ICA	Interviews, policy documentation, annual report, website
ICA Properties	Interviews, policy documentation, website, site visit
ICA Store owner	Interviews, site visits, participant observation, documentation
YIT	Interviews, participant observations, annual report, website, site visit
AP Fastigheter	Interview, site visit, annual report, website
Wira Fastighetsservice	Participant observation

TABLE 1. THE COMPANIES INVOLVED IN THE STUDY AND WHICH RESEARCH METHODS I USED TO COLLECT DATA ABOUT THE COMPANIES AND THEIR OPERATIONS.

ICA Properties' primary focus is to create market places, which involves establishing, developing and managing properties for ICA stores. They build, renovate and plan buildings which the ICA stores rent from them. The company's headquarter is located in Västerås, with two regional offices, one in Malmö and one in Kungälv. ICA Properties operates throughout Sweden and in Norway. Sweden is divided in to five different geographical operational regions. This study is focused on the Kungälv subsidiary and its operational region.

ICA Properties owns some 120 properties, but the majority of the 1 400 properties that ICA stores occupy are owned by some other actor, often a bank, investor or other property company. ICA

Properties' strategy is to develop their properties until they are fully exploited and cannot be further developed and then sell them. They sell properties when they need funds to invest in new properties or to develop existing properties.

ICA Properties outsource the maintenance operations in their properties. In the operations of the Kungälv office's region the company YIT is the facility management company. YIT has a contract with ICA Properties to maintain the properties that ICA Properties owns in the Göteborg region.

YIT is a Finnish company with operations in a number of businesses, all related to engineering and consulting. YIT employs about 21 000 people and is active in Scandinavia and in the Baltic region. The business unit for building services maintain the ICA stores in Göteborg. YIT in Göteborg procure some services in the ICA stores from other companies, i.e. cleaning, lawn mowing, plumbing etc. YIT's agreement with ICA Properties includes all services, YIT procure the services they don't have the skills to provide themselves. I will not describe these marginal actors, which are many, they are part of the study, but do not need a closer introduction for the purpose of this report.

As mentioned above ICA Properties sells a substantial number of buildings, these are sold to investors of various kinds. One of the buildings included in the study was owned by AP Fastigheter (AP). Sweden's public pension funds are managed in several different ways, one of them is property investments, and AP is a public pension fund management company. AP's headquarter is located in Stockholm, but the company owns and develops properties in the major Swedish cities, their strategy is to invest in attractive property in central locations in Swedish cities with large growth potential. The company that owns the building is a state-owned property company, one of the largest property companies, focused on commercial property, especially retail properties. ICA Properties has signed a tenancy with AP and has also signed a tenancy contract with the ICA store; this contract is called a mirror contract, since the contracts are identical. The only difference is the names of the tenant and the landlord. AP arranges management of their buildings; in this case the small maintenance company Wira is contracted - ICA Properties is not involved in this process.

The ICA stores are run as independent businesses, but they are all part of the larger company ICA. The stores usually have one head manager, who also is the business owner. The shops I studied had approximately 80-100 employees. The ICA store owner's contracts companies to do several different tasks in the buildings, more about the relationships about who owns and who manages what in the following chapter 3.1.

The large corporation ICA is Sweden's largest chain of supermarkets with approximately 1400 stores throughout Sweden. There are four types of ICA stores, ranging from the smallest ICA Nära through ICA Supermarket and ICA Kvantum to the largest ICA Maxi. The sizes and the range in the stores vary and make up the different store concepts that ICA offers. The buildings studied in this case study were all ICA Maxi and ICA Kvantum, the two larger in the ICA range. The ICA stores sales totalled approximately 87 billion SEK during 2006 (ICA 2007).

2.2 THE PEOPLE INVOLVED

The people involved in the organisations have various backgrounds and different jobs. This section will give a short general description of the people in the organisations and their tasks.

The people can be divided in to two by looking at the clothes they are wearing at work. The Service technicians wear steel cap boots, workman's pants and jackets as well as belts with tools. I did Participant observations with this group. They have different backgrounds, for example: electricians, welders, general labouring etc. I did not meet or heard of any service technician that was formally trained as a service technician; however most of them had extensive practical experience.

The other group wears casual office attire to work and all of them carried a telephone with them. The backgrounds in this group varied a little bit more; the majority had long experience in the property sector or the construction industry either as engineers, administrators or labourers. Most of them had worked in the same company for many years and made their way to their current position through internal promotions.

The division according to the peoples' clothing might not always be the most appropriate, however during the study this division was obvious and became logic to use, since their appearances, attitudes and ways of speaking differed significantly.

2.3 A DESCRIPTION OF THE NETWORKS

This section describes the two networks in more detail. The description is based on the two previous chapters but aims to add an extra dimension in analysing the relations between the actors. Figure 2 below illustrates the networks and I will refer to the network marked with a blue and dotted line as Network 1 and the one marked with a red line as Network 2.

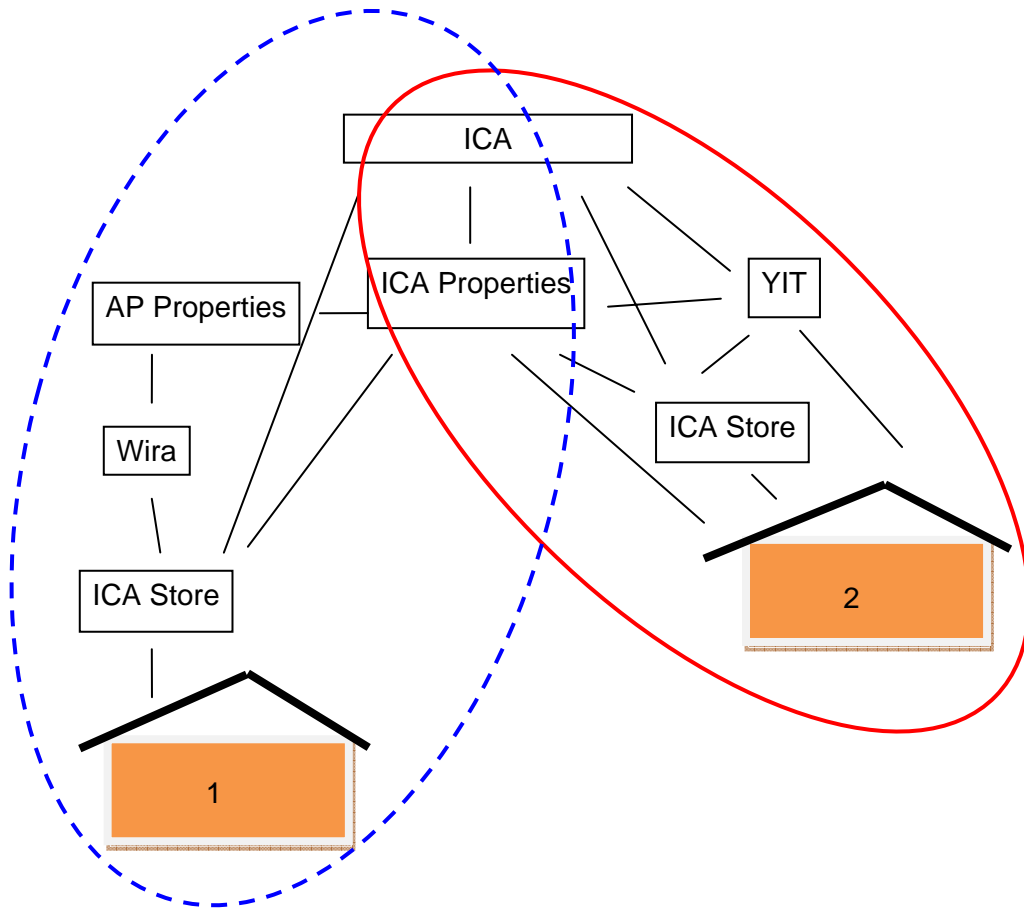


FIGURE 2 THE NETWORKS OF ACTORS THAT ARE INVOLVED IN THE MANAGEMENT OF THESE BUILDINGS THAT ARE USED FOR SUPERMARKETS. I CALL THE NETWORK MARKED WITH A DOTTED LINE NETWORK 1 AND I CALL THE NETWORK MARKED WITH A LINE, NETWORK 2.

The property owner, AP, in network 1 owns properties of varying kinds. However most of them were used for retail. AP has contracted a small firm to handle the operations of some of these buildings. The facility manager at AP (FMAP) has contracted a service technician from Wira (STW) and acts as his manager. They have daily contact and STW sees FMAP as his manager. FMAP is however formally STW's client. At the same time FMAP considers STW as his employee, even though they don't work for the same company. FMAP has a background as a service technician himself and has done a career within the field and is now a facility manager. STW manages several different types of properties, apart from the one ICA store; he manages a large IT-office, a bakery, a carpet store and a play centre for children to mention some. It was obvious that STW considered the users of the buildings as his clients and FMAP as his manager.

The relationships in this network were mainly based on the spoken word. I saw very few written documents with work orders or contracts being used. However, the actors in the network used an electronic reporting system for errors and repair needs. The users reported the problems they

wanted serviced to a call centre, which then sent out work orders to the STW's hand held computer. However, many of the tenants called STW directly, without going through the call centre. The STW explained to me that he had a special relation to the staff in the ICA store and since they were a large client, they often contacted each other without going through the call centre. The STW had a list of tasks that had been reported in his computer. He used this list as a log of tasks and checked it to make sure that he did everything he was asked to do. STW referred to contracts a couple of times during the work when there were discussions about who was supposed to pay for repairs, depending on who owned the faulty equipment or had the contractual agreement to service it.

STW was familiar with most of the tenants we visited and had many friendly chats about various things with them; the main topic of conversation was the heavy floods that damaged parts of the local area just a few weeks before the time of the study. STW explained to me that a key element of his job was to keep the tenants in a good mood, he said further that he tried to do that by talking to them and letting them know that he was on top of the situation and had paid it some attention even though he might not know what to do about the issue.

STW talked about his predecessor, who was a man who had recently retired. STW said on several occasions that he had been nervous about filling the gap which appeared when that man left. However he was happy that he had managed to build good relations with his tenants and that they seemed to be happy with the way he worked. FMAP agreed that STW was filling this position in a good way.

FMAP explained that he had worked in the property management field all his life in various positions and as a manager for the past several years. Only once has a tenant requested any environmental data what so ever. He saw this as a sign of the tenants not being particularly interested in the environmental performance of the properties they were leasing. He explained that he holds meetings together with the service technicians where they go through the energy consumption of the properties. These meetings mainly dealt with finding abnormalities, e.g. they found that one of the buildings had a considerably larger consumption than it was suppose to have. During the meeting they started to discuss and finally figured out that the switch for the underground heating was on. This heating system should only be used in winter to melt snow and ice on the driveways. This heating system was then switched off and the consumption decreased and went back to normal. The meetings are also used for follow up and general discussions about their properties. The company was in the process of implementing a new information system for their energy data. Their current system was based on an Excel spreadsheet that they had contracted a person to manually enter energy data that was mailed to him. The new system relied more on computers and offered more options to analyse and monitor the consumption. He was enthusiastic about the new system.

The FMAP told the story of how he and STW went on an emergency rescue, as he called it, no people were in danger. He suspected that an underground room, that housed the diesel powered sprinkler system, would be completely water filled during the floods. He called STW in the evening and they went there together, they opened the door and found that it was filled with water; they alarmed the fire department and decided that this room needed to be completely renovated. The FMAP is passionate about the buildings and does not hesitate to work hands on

with technical problems. He has extensive experience of hands-on property management and to me it seemed as he likes excitements like the situation above.

The property owner in network 2 was specialised in properties for supermarkets. The majority of the properties owned by this company were used for this purpose. They owned a very limited number of other properties, e.g. post offices and a care centre. They used to employ their own service technicians (ST), but started to contract specialists about fifteen years ago. The main service technician, who was employed by YIT, were specialised in servicing supermarket buildings. He was responsible for all the eleven supermarkets that ICA Properties managed in the Gothenburg region. He had extensive experience of managing supermarket buildings and gave the impression that he was quite independent; ICA Properties as well as the tenants were treated as clients. The people in this network had a better understanding and knowledge about supermarkets and what it involved to run a store as a business. They were very used to communicate with ICA store managers. The service technician told me that he had done almost all duties in a store, but he hadn't been in the check-outs yet. He explained that he helps out if the store is in trouble. Also the facility managers had a solid understanding of what operating a store involves. Most of them had worked with supermarket properties for a long time. One of the staff members who were a civil engineer, used to design and construct new stores, but had moved to the management side of the property company a few years ago. He knew a lot about how the stores used to be built and how they are built now. The manager of the regional facility management office had worked as a facility manger for several years in the same company. She knew most of the ICA store owners and also had a good understanding of what it involved to be an ICA store owner. This understanding assisted them in knowing more about who paid for what and who wasn't supposed to pay for other things. They were also keen to plan their renovations and interruptions according to seasons. They cared about not interrupting the main shopping seasons.

Most of the equipment in the properties in this network was controlled remotely by a consultancy firm. The ventilation, heating and cooling could be changed and monitored remotely. The property company had access to these data and controls from their regional head office, however they only used it occasionally for monitoring. The technical changes and changes in input parameters were done by the consultancy company and the Service technicians. The STs called this consultancy company when they needed assistance with the system. The STs were the ones operating the system in the store, but it was limited what they were allowed or could do. They used the consultancy companies as a help desk and as guides to change settings in the systems. The tenants could not change anything themselves. It was often different consultancy firms for different systems in the stores.

The property manager had an extensive program for construction materials. The buildings they constructed, renovated or extended were all rather similar and the company had guidelines for which materials that were allowed and not allowed respectively. The environmental performance of all materials used in the constructions was documented in thick folders in the regional head office. They used Building material declarations (*In Swedish Byggvarudeklarationer*) to collate information about the environmental performance of the materials. There was also a central environmental department in the company's head office in Västerås. They decided what environmental criteria the materials had to fulfil to be allowed to be used or not.

The facility managing company YIT played a key role in this network. They were contracted to service all ICA Properties' buildings. They did that by either using their own staff or by contracting other companies to do some of the tasks included in the service agreement. YIT became a hub for all the services in the buildings, especially the STs that were out in the different buildings all day, every day. The STs received most of the complaints and service orders through their mobile phones or when they met managers or staff in the buildings. The STs also offered the service of repairing things in the buildings that not were included in the service agreements. This gave them an overall service responsibility that the ST in network 1 didn't have. The majority of services went through the YIT STs in these stores, apart from the ones that needed special competence, e.g. refrigeration. As I will elaborate on in a later chapter the STs have quite some freedom to choose where they purchase their goods from and who they decide to contract for special repairs, this goes for both networks. The STs in network 2 spent some efforts to distinguish between which services were included in the service agreement and which services they were supposed to invoice separately. The combination of service agreement and other separately contracted duties in the buildings gave the STs in this network an overall responsibility to service the buildings as their own. They often referred to the buildings as "their buildings".

3 PART II - THE FIELD

The following chapters will tell my story of the management of buildings used as supermarkets. It will describe the experiences and the findings from my field study. Throughout the story there are findings related to the research questions. The story is told in a narrative way that is personal and unique. I understand that some of the reflections in the story might be biased and subjective, however as explained in the methodology chapter above; that is characteristic of qualitative research. I aim to provide an in-depth description of how the management of the two buildings function and what paradoxes, phenomenon and obstacles that occur in relation to environmental performance in the process of managing these buildings. The story is divided in separate sections. The first continues on from the previous chapter, by setting the scene even more. Findings from the field about the working environment and its culture are presented in this first section. These findings provide a deeper understanding about the conditions in which the links between the environment and the organisation appear. This understanding is valuable if change programs should be initiated and to be able to relate to why the links between these two components exists in the way they are. The next sections deal with the connection between the organisation and the environmental issues, waste, energy and water. The last section details management issues in relation to the environment, issues such as environmental labelling, competence and daily work routines are explained in this section.

3.1 SETTING OF THE SCENE A BIT MORE

The people in this system of organisations have their own culture and ways of acting. This chapter will describe characteristics of this culture. The activities and behaviour are described under separate headings, but intend to provide an understanding of how the sector functions from day to day. The intention is also to explain some obstacles and cultural behaviours that affect environmental change in the studied buildings.

3.1.1 *WHO OWNS WHAT? AND WHO MANAGES WHAT?*

Network 1 & 2

It is interesting to study figure 2 closer. It illustrates a number of companies that are involved in the management of two buildings that are similar. There is however more actors involved in the management of the buildings. I will not even attempt to outline all of them; they are too many and are constantly changing, depending on their contractual agreements and business interests. I will however give a few examples of what difficulties the involvement of many actors may have.

In theory the ownership is organised so that the property owner owns the floor, walls, roof and the grounds around the building. The property owner also owns the heating, ventilation and air-conditioning (HVAC) systems in the building. The property owner is in charge for the maintenance and service of these components of the building. The ICA store owns most of the interiors, such as lights, fridges and freezers, shelves, toilets, furniture etc. The ICA store is responsible for the service and upkeep of these. Some of the fridges and freezers might be owned by a third type of actor, the supplier of goods, e.g. an ice-cream producer that leases or lends a freezer to the store. The ice-cream company is then in charge of re-stocking the ice-cream, but also responsible for the maintenance of the freezer. This complex multi-actor situation makes the management of the buildings and their equipment complex.

“It might be a good idea to mark up these pipes one day, to know which belongs to whom”

The above was expressed by one of the Service technicians (ST) during an inspection of a cooling system in one of the buildings. The room we were in was completely full of pipes for the cooling system. There were two different systems; one provided cooling for the fridges and freezers in the supermarket, the other for the air in the shop. The latter was owned by the property owner and the former owned by the ICA store. Since they had different owners they also had different service providers. The ST was supposed to service the cooling system for the indoor air in the store. He had difficulties figuring out which pipes belonged to that system and which ones belonged to the other. He was neither authorised nor paid to touch the other system. The fact that the system spanned over two floors and through four different rooms didn't make the task of distinguishing the pipes from one another any easier. He solved the issue by checking all control points he could find in both systems and noted down the figures that he thought were relevant.

On another occasion, in network 1, a ST got in to a discussion with a tenant about who owned and was supposed and allowed to service a fan. The issue was not resolved on the spot; they decided to check with the property owner and in their contracts.

During my observations in the field, a lot of time was spent on establishing and distinguishing what belonged to whom and which tasks the STs were supposed to do according to their contractual agreements. The STs were contracted by the property owner to service their property and equipment, but in one of the cases was the ST s frequently contracted by the ICA store to do regular maintenance in the store such as changing lights, smaller repairs, carpentry and general maintenance duties in network 2. These extra tasks were then invoiced separately to the ICA store, which forced the ST to understand and discuss what was included in the contract and what was to be invoiced separately.

During the interviews with management staff the contractual arrangements were explained to me, it became obvious that they had a standard arrangement, as outlined above, with the ICA stores owning the interiors and the property owner owning the physical structure and the land areas around it. However most of the leases had some unique arrangement, where the standard outline not was followed. The management personnel also spent time understanding who owned what and who was responsible for the service of what. Understanding and interpreting a contract when many stakeholders are involved is a complex task. Another factor that makes the task further complex is that the actors involved change quite often and irregularly. The contracts for the different services are not re-negotiated at the same time. An example of this is from one of the stores. The owner of the store had been in that particular store for approximately one year and had service contracts for his cooling system that followed on from the previous owner of the store. The current owner was satisfied with the service he received, however he had contracted another company to do the general servicing of his store.

When there is a complex structure of owners that are changing on a regular basis is the holistic long term planning and investment strategies difficult to achieve. These are two factors that are pointed out as important to good environmental performance in buildings. Many of the larger environmental improvements such as that can be made in buildings requires a holistic approach and most of these improvements require investments that can be expected to provide financial return on a longer term than the regular business investment, i.e. up to 10 years or so. When the

actors keep changing and there a lot of actors involved with different opinions and strategies, is it difficult to make a decision about an environmental improvement and even more difficult to realise such improvements.

3.1.2 WHAT DOES A SERVICE TECHNICIAN DO?

Network 1 & 2

A service technician's main task is to manage the day to day maintenance and operation of properties. The expression: *The spider in the web* is commonly used to describe the job. The expression means that the service technician (ST) is a hub for the maintenance in the building. Being an ST includes diverse tasks; the ST receives the reports about maintenance needs in the building, is the contact towards the tenant and towards the landlord and arranges/contracts specialists to do more advanced repairs. The ST is also doing smaller repairs, alterations and controls in the building.

The STs I studied served several buildings, up to 10 each and drove a car between the different locations of "their" buildings. They had up to 10 buildings that they serviced regularly, about every second day. The STs usually had additional buildings where they had smaller contracts, in these buildings could their responsibilities cover one fan or a small heat pump or the servicing of a furnace. The STs had less frequent scheduled controls of these equipments and were contacted if any problems with the equipment occurred.

The STs spent a lot of time talking in their telephones and talking to the people they met. They talked to tenants, workmen, and ICA store staff, other STs, their managers and many more. The service technician spends a lot of time on the phone, in the car and in the buildings. The STs' work days varied from day to day and included many different tasks, one of the STs said:

I've done everything in the store, apart from slicing meat and tending the check-outs

3.1.3 TALK IS KING

Network 1 & 2

As explained in the previous section are the service technicians spend a lot of time talking, either on the phone or to people they meet. The managers also talked a lot. A talking culture was prevailing.

In network 1 a comprehensive reporting system for maintenance needs was in place. The system was used by the smaller clients; however the ICA store phoned the ST direct and had discussions and arranged for maintenance. On several occasions the person that called the ST was directed to talk to the call centre instead of reporting direct to the ST. The mini-computer that the ST carried with him with all the reports about maintenance needs was frequently updated and the ST was able to create a "to do" list based on the reported service needs. It was up to the ST to rank the priority of the tasks that were reported.

Most arrangements were made via the phone, mobile phones in both networks. In addition telephone communications, there were numerous conversations with tenants, staff, managers and contractors done throughout the days. The spoken word was totally dominant; emails, instant messaging or letters was not present in the communication. Gluch (2005) explains that the there is

a culture where talking is the main mode of communication in the construction sector and from this case study, the same could be concluded for the property management and maintenance sector.

One of the managers at ICA Properties, in network 2, emphasised the importance of the social competence i.e. talking for maintenance staff to be successful in their job:

Let's say there is a paper picker, he is just outside and picks paper, he does exactly what he is supposed to do, but he doesn't say anything, he doesn't speak to the staff in the stores, he doesn't say hello, he doesn't tell them he has been there, they never see him. It is clean though, so they can't complain but they get the impression that things don't work, no one has been there. They might think that paper must have blown away or something. It is very important to have some social competence, to tell the tenant that this and this have been done and this was broken and it will be fixed soon. It is important to tell the tenant what is going on and to show that we care about them.

One of the STs in network 1 expressed that part of the job is to keep the tenants cool, and by just talking to them can many of the problems be solved or defused.

The STs in both networks expressed that it is important to keep good relations with the tenants, contractors and managers, This is done by talking to them and to do one's work load properly, but also to make sure that the tenant knows and feels that the ST is on top of things and that things are under control in the building.

The STs had many friendly chats and shorter conversations about trivialities as well as issues concerning the maintenance of the buildings with people they met in the buildings. They were familiar and friendly with most of the people they talked to in the buildings; the STs were well known in the buildings. Almost all communication was verbal and occurred during occasional meetings in the buildings or via the phone. The STs kept most of the information in their heads, notes were rarely taken, however in network 1 was a central information system in place where some of the information was stored. The chats and the occasional conversation were obviously not stored in that system. A good memory and the gift of the gab help the ST to do the job well.

3.1.4 A LOT OF MEN

Network 1&2

I met a lot of men, I just met one woman and there were a few male orientated jokes; however all the men wanted more women in their workplace.

The domination of men in this industry became obvious during the study; the notion workmen really fitted well. There was however an interesting interaction in the studied buildings, most of tenants' personnel was female; the retail industry is a female dominated sector and the STs were men. The atmosphere was friendly and polite. The STs changed their mannerisms and behaviour depending on who they were communicating with. The jokes were of different character and the expressions they used changed depending on how they were conversing with.

The tenants' personnel were mainly females; however the tenants were men i.e. the store owners. Also most of the contractors' staff and most of the managers were men. Everyone I spoke about

this to in the study said that it would be beneficial to have more women in the buildings service industry. The manager of some of the STs in network 2 said:

No, we don't have so many girls working here; we have one on a work placement here at the moment. I hope she likes it and becomes a Service technician. I think it is positive and fun, really positive to have women working here. Our customers react differently when the Service technician is a girl, some good reactions and some bad, but usually good ones. Some customers might think that girls don't know as much as guys, but most find it nice and are really positive. So I think we should have more girls here, it also affect how the other 25 guys behave. They behave much better when there are girls around

There were however no strategies for how to recruit more female employees in place in any of the companies.

In the maintenance as well as in the management parts of the industry the male dominance was present. It is interesting to note that the head for the regional office of the property owning company was a woman, who had made career in this sector over the past ten years. I would however still claim that the culture in the management of the supermarkets had many male attribute and was male dominated.

3.1.5 IT IS UP TO YOU!

Network 1 & 2

The service people had a lot of freedom to choose how they wanted to go about the tasks they faced in the buildings that they were in charge of. They all appreciated the level of freedom that this situation gave them in their daily job.

When parts needed replacement they were purchased from the closest suitable store, there was no central warehouse in the company where parts could be collected. No skeleton agreements were in place. Some of the Service Technicians had their own “warehouses” in the actual buildings, where they kept smaller quantities of the material that was most commonly replaced in that particular building. The STs preferred to go to stores where they quickly could browse through some of the store's range for their own leisure.

The STs also had the freedom to hire which ever contractors they wanted to. The STs had their network of contractors that they usually used, since they felt confident that these contractors would do a good job. They usually based this opinion on previous experience. In some cases it seemed that they contracted someone they knew or were friends with. One of the STs in network 1 explained:

I have my circle of guys that I usually call, when something needs to be fixed, I call them because I have used them before and the result has been good. But in this case with the exhaust fan at ICA, where they were sloppy, I don't think I'll call them again for a while. I might try someone else next time.

Since there were no formal skeleton agreements, the environmental performance of the contractors was not assured. The environmental performance of the material that the STs bought to replace the broken items in the buildings was not necessarily purchased with environmental

issues in mind. The environmental impact from the building is dependent on how the building changes. If changes are done with environmental concerns or not affects the environmental impact from the building. There are no requirements or guarantee for the environmental performance of neither the contractors nor the replacement materials in these stores. This situation leads to the stores' environmental performance being unknown and might not change in a positive direction.

3.2 ENERGY

Climate change is probably the environmental issue that is given most attention in the media and by people in general these days. Energy consumption is closely linked to this issue. Carbon emissions from incineration of fossil fuels for energy are a major contributor to the climate change.

The response to the climate change issue is usually energy efficiency measures and changing to renewable energy sources. Another main driver for energy efficiency is the decreased costs for energy that needs to be paid for the consumer. The following section examines how the organisations deal with energy efficiency, why they do it, how they do it and also why they don't do it and what organisational obstacles there might be to energy efficiency and change to renewable energy sources.

3.2.1 Energy efficiency used to cut costs

Network 1 & 2

The main driver for the energy efficiency improvements is the potential lower energy costs. The environmental reasons for improved energy performance are rarely spoken about.

All participants in the study talked about payback times and savings in financial terms. Energy savings were often called just savings, which really meant financial savings. There were no discussions about reducing energy consumption because of the climate change issue or for the reasons of good publicity. The main driver and motivation for energy savings was saving money. Many of the participants noted that the interest for energy efficiency had increased during the past year or so, due to increasing energy prices.

One of the ICA store owners in network 2 called a meeting about energy efficiency in his store because his energy bill had increased significantly during the past year or so. This store owner initiated a project about how to reduce energy consumption in his store. I attended a first meeting in this project, more about this meeting in chapter 3.2. The store owner declared very clearly that the reason for the project was that his cost for energy was becoming too high. He wanted to investigate how those costs could be cut. He did not mention any other reasons for the project. The environmental issues were not even mentioned as a secondary reason

One of the property owners elaborated on how the tenants had become more interested in energy savings and how this development can have spill over effect to other areas

The energy prices have really taken off over the past years, another thing that will become more expensive in the future is water, tenants will be interested to start looking at how they can save water in the future, it is cheap now, but in a few years that will definitely be more expensive, really expensive

The cost is an important factor, which motivates savings in consumption of resources in buildings. Environmental motivation for decreased resource use is rare, another of the property owners I interviewed reflected on how the interest for environmental performance in buildings is limited:

I have worked in this job for decades and only once have I been asked for environmental data from a tenant, we sorted that out quickly over the phone; the tenant asked because he had to fill out some forms.

The energy costs were in focus for all conversations I listened in on or had with the people I studied about energy efficiency. The environmental aspects of energy consumption were only mentioned in token comments, i.e. the issues were only mentioned since the interviewees felt obliged to mention them.

3.2.2 SELLING ENERGY EFFICIENCY

Network 2

I conclude from the two previous chapters that the organisation of the ownership, maintenance and the management is complex and that cutting costs for energy is the main motivation for improving energy performance in buildings.

The facility manager that was contracted to service some of the stores also offered energy audits and tried to sell energy efficient solutions to their customers. A manager at this company summarised how the above situation affected his work to promote energy efficient solutions by:

It is important to know who is holding the wallet

Most of the energy efficiency solutions that this company was promoting included some initial investment which made the building consume less energy during use. The lower consumption would then pay the initial cost after some time. With the complex owner, tenant and maintenance structure it is not necessarily so that the actor paying for the investment that will reap the benefits of the lower operation costs that the investment will bring. It is important for the company to understand the organisation to such extent that the efficiency solutions can be proposed to the organisation that actually will see the benefits of decreased energy costs. The notion that investments for energy efficiency can be motivated by the so called pay-back argumentation is not working in the organisational structure with many actors involved. As the quote above says; it is important to understand which actor will be paying for the investment and which actor gets the lower energy bill, which the investment creates. The same manager continues on the financial incentives used for energy efficient investments:

The customer will usually buy it straight away if you can present a pay-back time of one year, but I think that pay-back times up to three years are reasonable and should be discussed, but to propose anything with longer times is just not worth the effort.

The financial motivation for energy efficiency seems to be most efficient when it comes to changing already existing buildings and the systems within them. Both the facility manager acting as a supplier in this case and the store owner were comfortable with this type of reasoning.

The facility management company in the study invites their customers to meetings about energy efficiency on a regular basis. Their customers are however not always in the positions to change the current situation. The facility manager's customers are usually property owners and not the tenants creating change and finding financial incentives for energy efficiency investments with only the owners present is difficult. The tenant is an important factor that not is invited to these meetings.

Some of the problems with the financial arguments for environmental change are identified by the actors. One is described above where the investor doesn't pay the electricity bill. Another is when the tenant has a short term contract or when the property owner has short term investment plans for that building. A third situation is that one of the actors is having financial difficulties:

Smaller businesses are not so keen to invest in their property if they don't know if they have orders coming in for the next year, whereas large and secure tenants such as Volvo or Swedish Match are keener to act on a longer term

Two of the managers at ICA Properties explained how their problems with long term investments differ from the regular property owner's:

The tenants as well as we are interested in improving the efficiency in the property, since both of us belong to the same corporate group. We get our bonuses from the same cake.

They gave an example of how they did a cooperative effort in investing in a cooling and heating system in one of their smaller properties together with the tenant. The tenant was investing in a new refrigeration system for the store. Through a joint investment with ICA Properties a new ventilation system was also installed. This system used the heat that the refrigeration system produced as a waste when cooling. By replacing the old ventilation system at the same time as the refrigeration system, more energy efficient operations achieved. ICA Properties had to put money towards an investment that was a little bit outside their scope. The previous ventilation system could have been used a bit longer, but the waste heat from the refrigeration system could be used and the energy was used significantly more efficient than if the ventilation system were replaced at a later time. The tenant is paying for the energy used in both the ventilation system and in the refrigeration system; ICA Properties paid for neither. The manager at ICA Properties explained that the reason why they agreed to this investment was that the two actors belonged to the same corporate group; it would help a fellow group company to cut operation costs significantly.

The motivation for energy efficiency is complex in several aspects. The physical and technical understandings of energy efficiency measures are complex. Many research efforts have been made to improve the technical aspects of energy efficiency in building structures. There is a wide range of different technical options for improving energy consumption in buildings, however, it is a comprehensive task to understand and identify what is the most suitable and feasible energy efficiency measure for each particular building. Before even starting to assess the available technical options, the current technical status of the building needs to be identified. Apart from the technical aspects the organisational structures are important to understand in order to be able to promote energy efficiency measures to the relevant actors.

The task of motivating energy efficiency in buildings is complex and requires knowledge about the technical aspects as well as the organisational and behavioural aspects to be successful. A multi-faceted understanding of buildings and the organisations governing it will assist the process of motivating energy efficiency, whether the efficiency measures are behaviour change or investments in energy efficient technology.

3.2.3 *THE GRAND TOUR OF PLANT ROOMS*

Network 1&2

Each building had several plant rooms from where the building's systems are controlled. These rooms are filled with electronic equipment and large machines, such as heat exchangers, fans, dampers, pipes and ventilation canals. Most of the equipment is wrapped in shiny aluminium foil or are made of metal. The modern plant rooms have a bright futuristic feel about them, while the dated ones often are darker and have a higher level of noise. The rooms were very similar in the different buildings.

The plant rooms function as the hub for the technical control of the building, the indoor temperature; operating hours and configuration of the ventilation system were all controlled from these rooms. The room was also a hub for the maintenance staff that worked in the building. The different types of staff often met in these rooms, randomly or in planned meetings, yet another way of meeting and talking to get updates and be briefed about what was going on in the building.

Figure 3 below aims to map out which types of professions that visit a building's plant room. The frequency of the visits varies between the different professions. The service technician visits the room almost on a weekly basis, whereas the inspectors might visit on a yearly basis or so, some inspections are even more infrequent.

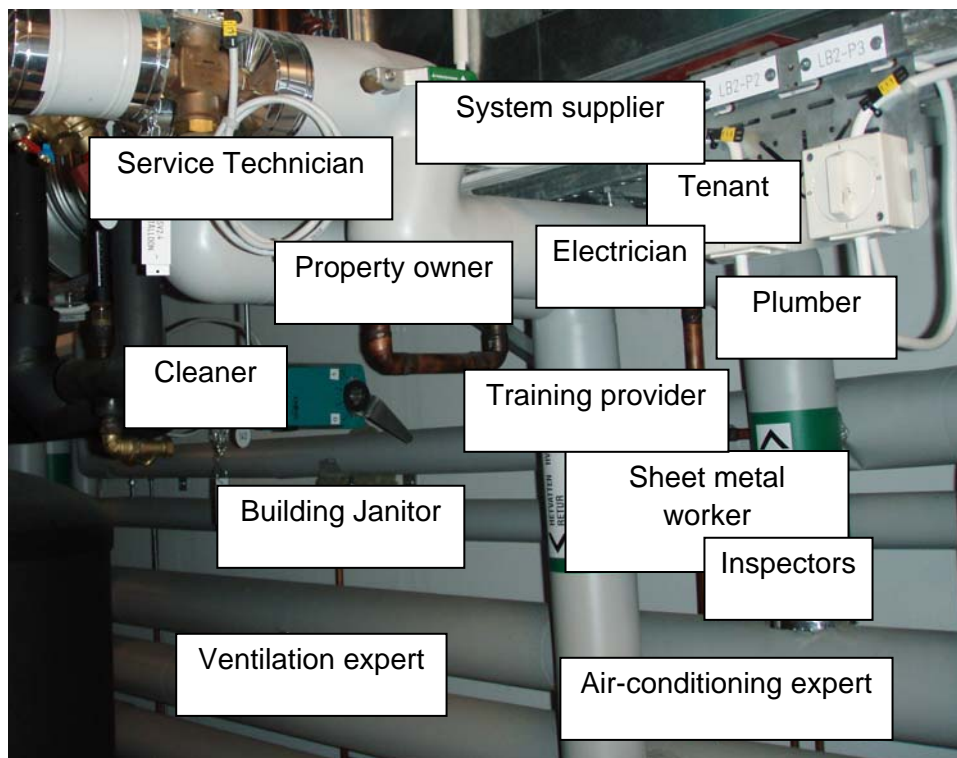


FIGURE 3 AN ATTEMPT TO MAP THE TYPES OF PROFESSIONALS THAT VISITS THE PLANT ROOM IN A BUILDING. THE FREQUENCY OF THE VISITS VARIES BETWEEN THE DIFFERENT PROFESSIONS, FROM WEEKLY VISITS TO YEARLY.

It was striking that the plant rooms looked very similar even though they were located in different buildings. As an example was one of the STs responsible for the service of 9 ICA stores, during an average week he would visit most of them, each of the buildings had up to four plant rooms, which to me looked very similar. The ST had to use the manual to locate certain machines and inspection points in the different plant rooms. The ST expressed that it could be confusing to get his bearings in the different rooms since they were so similar.

Most of the plant rooms had a cupboard filled with electronics and computers, where the machines and the equipment were controlled from. There could be several of these cupboards in the same plant room.

It was explained to me that there were so many plant rooms because as the ICA store's sales increases, a need for larger store space emerge and additions were made to the buildings. An extra need for ventilation and air-conditioning emerged when the buildings were extended. It is not obvious to purchase the new equipment from the same manufacturer as the old equipment since the competitors might offer a better price or better performance. A new independent system was often chosen since it would have been difficult to include the new system in the existing one. The operation of the different systems was however made more difficult by deciding to install an independent system. Installing independent systems, from different manufacturers as additions to existing systems creates a maze of similar looking plant rooms, which functions differently for the STs to work in.

3.2.4 COMPUTER AIDED VENTILATIONS SYSTEMS, ARE THEY AN AID?

Network 1 & 2

The plant rooms filled with the electronics are often controlled remotely; supervision can also be done remotely. There is however some need for on the spot inspections. When the system fails, the Service technician will be the one responding to the call from the user of the system and will be the person in the plant room dealing with the issue. The ST is also expected to collect data from the plant room about the system and to do regular checks of the systems. All of these actions require the ST to log on to a computer system and to perform certain actions in the system. One of the findings from the study is that the confidence in using computers among the STs is limited. The tasks involving computers became large obstacles for the STs and were put off and turned into problems that slowed down their work process.

It is important to note that the STs had a large number of computer systems to deal with; it was mentioned in the section above that one of the STs serviced 9 buildings and that each building could have up to 4 plant rooms. This means that the ST might deal with up to 30 – 40 different plant rooms. The computer systems and the passwords differed in the different plant rooms. The main differences are between systems produced by different manufacturers, but there are also differences between systems of the same brand depending on the year they were produced. It is an overwhelming task for any person to deal with this quantity of different computer systems.

The younger as well as the older STs expressed their worries about working with computerised systems:

“When it comes to computers I feel I can’t keep updated with the development, it is just too difficult and things change so quickly.”

“I really don’t want to press some button that messes up the whole system; the stakes are too high to take chances in these systems. If the system is put out of balance it could take weeks to get it back on track again. It is just not worth the risk.”

“Back in the days you could fix things with a screwdriver, you need a degree in computer stuff to fix things nowadays.”

“Even though I really want to keep up and learn there is not just enough time to do it, there are so many other things that need to be done in the buildings.”

The computerised systems that are intended to improve the efficiency during operation might actually be creating a number of issues in how the systems are operated instead. The computerised systems are however an essential part of the functionality of the buildings. The demands on the indoor climate are very strict in a supermarket property and sophisticated systems are required to meet these demands.

More time for training in using the systems is necessary for the STs to be able to benefit from the features of these computerised systems. A more consistent approach in choosing systems when extending and refurbishing existing buildings would also ease the use of computerised systems.

3.2.5 COMPARING KILOWATTS TO TOMATOES

Energy efficiency measures are often being motivated by lower costs for energy during use as explained in chapter 3.2.2. In the same chapter some problems with financial incentives are explained. This chapter describes a situation where this method of motivation is short-circuited.

The Service technicians were replacing some broken spotlights in the fruit and vegetable section of a store during one observation session. This was a reoccurring problem with this type of spotlights; the reactor part connected to the spotlight was broken and needed to be replaced. The replacement procedure took approximately 10 minutes per spotlight, a number of lights were broken. I decided to count the number of lights in the fruit and vegetable department in this particular store during the somewhat lengthy procedure of replacing the broken part in the light system. I had obviously been in a fruit and vegetable section of a supermarket before, but never counted the number of lights in it, I was amazed. I counted to 147 different sources of light in this section of the store. I also made an approximation of the area to 350 m². The lights were placed literally everywhere, but concentrated to the counters with goods for sale and in the ceiling. When I reflected on how all these lights made me feel in this section of the store was it a very fresh and clean feeling. I assume that is what the store owner strives for in the fruit and vegetables section.

The spotlights were strong, 100 W each and there were 39 of them. The lights had a certain yellow light that was specially chosen for the fruits and vegetables to look more appealing and fresh to the customers. The ST showed me the difference between having the spotlights on and having them off, the difference was remarkable. This particular spotlight was directed at tomatoes. The ST explained that the numbers of sold tomatoes increased after these spotlights with the special colour were installed. I saw the difference between lights on the tomato and no lights on the tomato and was convinced he was right.

The observation triggered the idea that the kilowatts that could be saved by installing fewer lights with lower consumption actually are compared to tomato sales in reality. Saving energy is perceived equivalent to saving money in the sector. In this case it is the same actor that pays for the energy for the spotlights and sells tomatoes.

The efforts of promoting energy efficiency by explaining that a spotlight with lower energy consumption will cost a certain amount less to use than the current one might be in vain. The store owner might not be interested since he compares the extra quantity of tomato sold when the spotlight with the higher effect is lit to the lower energy cost with fewer and more energy efficient lights installed.

The argument that making lights more energy efficient will save money is short circuited in this case. This relation might be difficult for a lamp supplier to understand, but it might be one of the reasons why the energy efficient lamps not are sold and be a source of frustration among the suppliers. Building technology suppliers often points out lack of customer demand as a main barrier to environmental improvements (Baumann et al. 2003; Gluch et al. 2007). This type of spotlights was centrally tested and different shades were specified for different uses by ICA.

The people promoting energy efficient equipment needs to revamp and invent more sophisticated sales argument to be efficient. I will elaborate on change processes, later in chapter 5.

This particular situation was present in one store in one of the networks. I merely speculate about why this was the case. I think that it has to do with knowledge, not about climate change, but about the lights, I think that the lights would have been more common in stores if the managers knew how good their tomatoes would look in the shine from the lights. I think that if the managers were able to calculate that the additional cost for energy for the lights would be smaller than the additional income from increased tomato sales, many of them would invest in the lights. However, if there were energy efficient lights that had the same effect on the tomatoes, the managers would probably purchase them instead. Once again it is about knowledge and information. If information about the possibility to save money and at the same time does something good for the environment, then many of the managers said that they definitely would do that. I was not able to see any distinct organisational differences that may have caused the difference in having lights or not. The only difference might be how efficient the marketing team at the light supplier had been with the store managers.

3.2.6 HUMANS AND COMPUTERS MAKE PEOPLE SWEAT

Network 1

Stewart Brand (1994) wrote the sentence: *Nobody builds a building, they just start one*. This sentence is a good starting point for this section, which is about how a commercial space could change and might not be used as it first was intended. This section describes an observation about how changes in the use of a building can change how a building performs.

In one of the building where an ICA store was located was also an IT-consultancy located. The Service Technician responsible for this building was also servicing this office. A complaint about too warm indoor temperature was made; the ST paid them a personal visit in their office.

The room was a large office landscape, almost empty just occupied to approximately a tenth of the space, approximately 20 people worked in this section of the room. Each worker in this office had two computers on their desks; they were doing remote phone-support for computer systems. The desks were small and the workers sat close to each other. The group were located in one of the corners of the large room that had windows. The outdoor temperature was -5°C and the complaint was about too warm indoor temperature. The radiators were on since there was a cold draught from the windows. The reason that the people were warm was the heat from the radiator in combination with the heat radiated by the computers and themselves.

The ST couldn't do much about this problem. He turned down the heat on the radiators and told them to be a bit patient, that he would monitor the temperature and maybe there would be an expert engaged in this problem. The ST explained to me that turning on the cooling system when it was minus five outside was against all principles. He explained further that he didn't know exactly how to do that just for a small section of that large room.

The room was probably not intended to be used in this way when it was designed. The intent was probably for the desks to be further apart and the whole room to be used with the same density all over. The room didn't satisfy the users' needs.

As in the examples from Brand; the use of the room had changed, which made the needs change. The changes caused new demands on the systems providing the climate in the room. If the problem continues the cooling system might be turned on or the workers have to spread out and

use more of the space in the room and maybe move away from the windows to avoid the cold draught. The change in uses, this one on a small scale, affects the needs and requirements as well as the environmental performance of the building.

A large challenge lies in designing buildings that can be adapted to changing needs and for tenants to consider the buildings function when moving and restructuring work spaces.

3.2.7 DOES ENERGY COST REALLY MATTER?

Network 1 & 2

The reasoning in the previous section leads me on to the question if the energy bill really is a significant cost what so ever for the store owner.

The energy bill for an ICA store is approximately 1 million SEK per year according to one of the facility managers. An ICA Kvantum store has approximately 80-100 people employed and sales inclusive of VAT averages to approximately 190 million SEK (ICA 2007). A quick estimation of the cost for labour and the sales explains that the energy cost is small compared to these financial flows.

However facility managers as well as service technicians did express that the interest for the energy cost in building operation increases when energy prices increase. The increase in cost matters more than the current cost for energy in the stores. The interest for the energy costs in the stores is dependent on the store owner's personal interest; this varies greatly between the different owners. However the STs as well as the property owners have noticed that more and more store owners are becoming interested in the energy costs for the operation of their store when the energy prices are increasing. A common understanding is also that most of the store owners are keen to cut costs and are very business minded. However the awareness of the possibilities of cutting energy costs varies between the owners.

The answer to the rhetorical question in the heading would be that the energy cost matters for some store owners and that it seems to concern more store owners when the cost for energy is increasing.

3.2.8 THE FIRST STEP TOWARDS ENERGY EFFICIENCY

Network 2

This report has been discussing barriers and problems with regards to environmental improvements in buildings so far. This section is however about a meeting where change was initiated and energy efficiency was the focus.

This section is about a meeting about possible energy efficiency actions, which was called by one of the store owners, the findings described are all from the meeting and when I refer to the user of buildings, it means the people using the building i.e. customers and staff. The meeting was held in the store owner's office, where he met two Service technicians. The store owner called the meeting since he was interested in saving some money on the energy bill, he was nervous about the current development; his store's energy consumption was increasing and so was the price for energy. One of the triggering factors for his interest in energy efficiency was the new bakery that recently had been installed. He explained that the bakery made up for 2.5 % of the revenue and 22

% of the electricity consumption. On the other hand, he explained, the smell from the bakery made the customers buy many extra things in the store. The store manager also explains that the refrigeration is a very large energy consumer in the stores, but the management of that system is separate so this system was not a major topic for the meeting. The store owner had already appointed a consultant to do an assessment of the store and propose saving measures. He also made clear that the store will pay for this process since they will receive the benefits from a building with lower energy consumption at the end of the process.

The STs had done some research the day before and found out operating times for the ventilation system and the temperatures that were set as desired in the systems. They also suggested that these times could be changed to be better adapted to the store's opening hours; the store manager liked this idea. The ST expressed that it was very important not to mention the changed conditions to the users of the building; they claimed with regards to their experience that if such information is released; the users become extra sensitive and will complain even if no changes are done.

After some discussion, it was decided that the STs will install temperature loggers in the store and log the temperature during the following two months. That data will then be used as reference data for future changes. They thought this was good since they will have good and reliable data on how the building performed before changes and will be able to compare that to how the building performs after the changes. They agreed that things will be very clear and the users will better understand the changes when there are figures available to be used for comparisons.

Several other issues related to energy consumption in the store were discussed during this meeting. I will write about one of them. When goods are received and stocked in the store a backdoor loading bay is used. The loading is done during the stores opening hours. If the door at the loading bay is open at the same time as the main entrance is open is a cross draught created. This causes the warm air in the store to blow out, which creates more need for heating in the store. The store manager had decided to solve this problem by investing in infrared door openers with double doors, which will create an air-lock in the loading bay. The infrared door opener will open the door quickly when a person walks towards it. This solution will stop the warm air to blow out when both doors are open, since there will be three doors and they won't be open at the same time. The store manager was pleased with this solution. I think this is a nice example of how technology can be adapted to the human behaviour rather than opposite. The solution improves the conditions for the people working in the loading bays, since they don't have to open the door themselves and it also decreases the energy consumption in the store.

This meeting was initiated by a Store owner, who was the tenant of the Service technicians' client. The property owner was not involved in the process at this stage but might get involved later. The store owner showed commitment and this meeting was a start of a process that will lead to energy efficiency measures in the stores.

3.2.9 A BREAKDOWN IN THE HVAC SYSTEM

This section is a story about how a failure in the HVAC system in one of the stores in network 2 was repaired. I followed the STs in their procedures and struggle to fix the HVAC system. The system was reported as broken by one of the staff members in the delicatessen part of the store. The store was filled with smoke from the chicken grill during the weekend. The HVAC system is

supposed to have a function where it is possible to force the ventilation so that smoke from the grill is extracted efficiently. This function did no longer work. The STs went to the plant room on the third floor, this room was filled with pipes, boxes and cupboards, everything in good order and clean, rather noisy but tidy. Most of the equipment was wrapped in silver foil. The STs opened a cupboard that held the computer controls for the system. The computer system was unveiled, it seemed rather complicated and neither of the STs was keen to deal with this problem before their morning cup of coffee. After a shorter discussion it is established that everything seems normal but that one of the main fans is not running. They call the help desk for the company that once installed the system. Ten minutes is spent together with the help desk over the phone until it is established that there is a broken part that needs to be replaced. They pull out this part of the cupboard and put in their pocket, coffee time.

The part needs to be purchased from a specialty store; we travel there together and get the spare part. Back in the plant room is the new part installed and the stopped fan starts again. I am then given a tour of the room and in-depth explanation to how the system works; they also inspect the system for problems and find a minor adjustment that is needed.

3.2.10 DIFFERENCES BETWEEN THE NETWORKS

It is difficult to quantify the differences between how the management of the buildings is organised and their energy consumption. There are however differences between the two networks that have some impacts on how much energy is used. Network 1 was more focussed on the customer than on the building itself than network 2, where the buildings and its technology was more important. Network 1 suggested that it was important to keep the tenants happy and pleased with the service experience. This experience did not necessarily have to involve fixing the problem, it could be talking and counselling the customer that made a complaint. If the complaint involved increased energy consumption, it was more likely that the complaint would be attended to quicker in network 2 than in network 1. Although the staffs in network 1 as well as in network 2 were both devoted and interested in their jobs, the strategies differed in how to approach a complaint, as explained above.

I believe that network 2 had a more proactive approach to energy efficiency and that the actors in that network had more competence about these issues. This was demonstrated in the energy efficiency meeting that I attended with one of the store managers. The STs contributed, were willing to participate and had several insightful comments. The ST in network 1 had a different relationship to the store manager. The relationship was more of a one way monologue from the store manager about what needed fixing, and not a dialogue about what might be good to improve or what could be changed in the future in the shop. Network 2 had an energy consultancy company as the service provider. Their competence about the HVAC-systems was obviously helpful in the energy efficiency work in the stores. There were also incentives programs for energy efficiency measures in place in this network. These programs were however too difficult to understand and the reward was not large enough to motivate the STs but the framework for the program was there and could be developed into something more useful. The property owner in Network 1 recorded quite a lot of energy data, but was in a data system transition towards a computerised system, which they believed would provide them with much data. The data was to be used for checking for irregularities in the energy consumption, not for improvement potential in what was regular.

There were differences in the two networks in their way of dealing with energy efficiency and energy consumption related issues. However it was not possible to establish how much difference in energy consumption these organisational differences can be accounted for. I provide some suggestions on how this pilot study can be modified so that such quantification is more likely to be achievable in a chapter towards the end of this report.

3.3 WASTE MANAGEMENT

This section gives one example of waste handling. There are many issues in relation to waste management, Recycling, Waste minimisation are two. A third is the upkeep and actual waste handling. The following section gives an insight in how the management of upkeep can interfere with the actual task that is to be carried out. This section is also an example of the downside of outsourcing tasks and involving numerous actors in work tasks.

3.3.1 *HOW MANY DOES IT TAKE TO PICK UP SOME CIGARETTE BUTTS?*

Network 2

Complex chains of actions for seemingly simple tasks are an effect of organising the service of the buildings the way it is in these two examples. This section elaborates on one of these simple tasks. The task in this example is when the service to pick up cigarette butts in front of the entrance to a store is failing.

This short story was told to me by a tenant i.e. a store owner. There are cigarette butts in front of the store and a customer points that out to the person tending the check-out in the store when paying. The person in the check-out will then call responsible supervisor and the supervisor will then tell the store owner, whom also is responsible for the building on the tenant side. The store owner calls the property owner and complains about the lack of service. The property owner has outsourced the management of the building to a facility management company, which has the responsibility for the upkeep and maintenance of the building and calls them to explain the problem. The facility managing company has however contracted the service of outdoor upkeep to another company, they will contact this contractor. The company contracted for outdoor upkeep had in this case contracted yet another company to do the cleaning and sweeping of the common grounds; this company is then contacted and will go to the store to pick up the cigarette butts. This is a very long process to perform a simple task. One might hope that someone from the staff in the store has gone outside to pick up the cigarettes butts. That is however not the formal way of dealing with the issue. The process resembles the kids' game called Chinese whispers, which is a game where a person secretly whispers a message to the person next to them; this person will then whispers that message to the next and so on. Mishearing often result in the message heard by the last player often differs a lot from what initially was whispered. If the message is a work order, as in the example, there is a big risk that the work order might be misunderstood or not even heard, there is also a significant risk for delays in the process of passing the work order on.

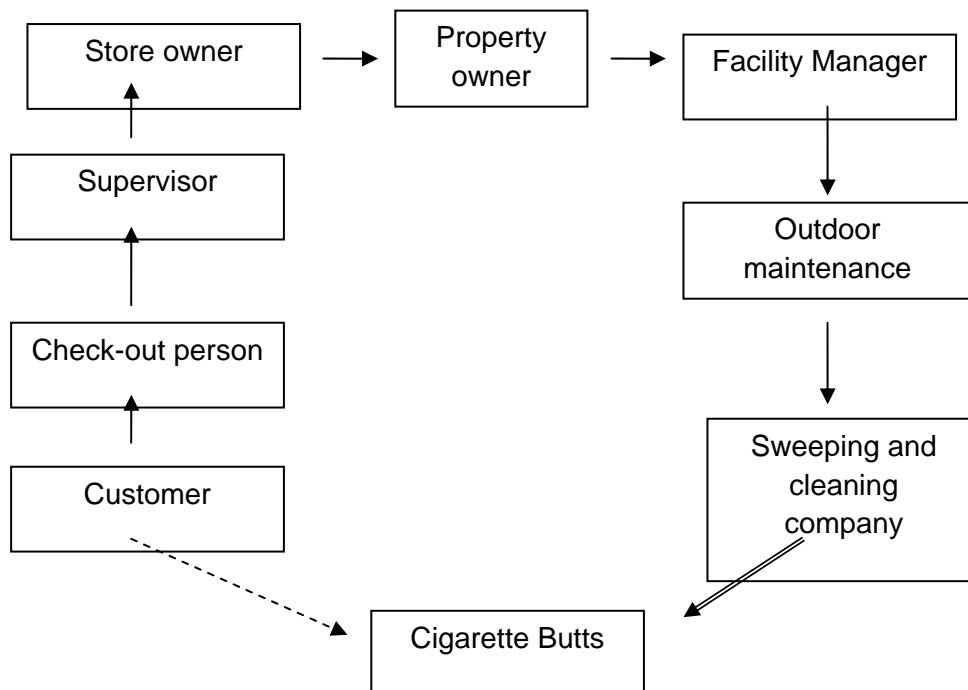


FIGURE 4 AN ILLUSTRATION OF THE COMPLEX SYSTEM THAT NEEDS TO BE ENGAGED FOR THE SIMPLE TASK OF PICKING UP SOME CIGARETTE BUTTS. THE FILLED ARROWS ILLUSTRATE COMMUNICATION AND THE DOTTED ILLUSTRATES SEEING AND DOUBLE PICKING UP THE CIGARETTE BUTTS.

The tenant that told me this story initially found this situation annoying and regarded it as “a perfect example of how not to organize a business”, but he also expressed that he did not really mind how people organised their businesses as long as it did what it was meant to do. One of the property owners explained that the benefits of organising the business this way was that when the organisation is properly established, there will be one specific number to call for all types of queries. There will however still be chains of action which the information needs to be communicated through. Czarniawska (2005) discusses similar situations and calls them action nets and action chains. I prefer to call them managerial Chinese whispers, since there is not much action between the different actors in my case, there is merely communication about actions.

3.4 WATER

Consumption of water affects the environment in several aspects. Production and treatment of drinking water consumes energy, so does the pumping of the water. The treatment usually requires some chemicals, which could be dangerous to the environment in excessive doses. Clean drinking water is also a finite resource. A water shortage is a major problem in many regions in the world. However none of the studied supermarkets were located in an area with a water shortage.

Toilets in Sweden are flushed with perfectly fine drinking water, treated pumped to the tank on the toilet. Savings in the amount of water consumed can be achieved by using a dual flush

mechanism on the toilet. The following section provides an insight to the mystery of dual flushing. The replacement of a flushing mechanism does not turn out the way a water saving proponent would have preferred.

3.4.1 THE MYSTERY OF DUAL FLUSHING

Network 2

One of the Service technicians was replacing a broken flushing device in a public toilet in one of the buildings during one of my observations. As discussed in the chapter 3.1.5 the procedure about how to go about doing smaller reparations was loosely defined and the ST had large freedom to decide how to do such tasks. The ST went to a close by hardware store to buy a new flushing device to replace the one that was broken.

The ST was faced with the option of purchasing a single flush or a dual flush device. The single flush device gives the user no option but to flush the full tank of water each time the toilet is flushed, whereas with the dual flush either the full tank or half the tank is flushed depending on the need. The dual flush option decreases water consumption in toilets with approximately 25 % (Cordell et al. 2002). The ST had one device of each kind in his hand but decided to buy the single flush device.

The ST explained to me that he personally thinks that dual flushing is a good invention and that it should be used more. The reason that he decided to buy the single flush device was that from his experience these devices do not work in public toilets. He explains further:

The risk of the toilet to clog is significantly bigger with a dual flushing device than with a single, a clogged toilet is one of the last things that you want to deal with in general and is particularly important to avoid in food stores for hygiene reasons.

The ST based his decision on his personal and professional experience and he also assessed the risks and compared them with the gain in water efficiency. I am not sure if he made an accurate assessment, but it made sense to him. Another factor that played a role in this decision was that there was no incentive for the ST to choose the dual flushing device, that choice was merely associated with risks for the ST.

As I pointed out previously; there is no guarantee that the environmental opportunities that exists are being realised when no procedures exists for how goods and services are procured.

3.5 CHANGING COMPETENCE NEEDS

Network 1 & 2

It was a general understanding that it was difficult to find people with appropriate competence to when recruiting service staff. As described in previous sections diverse skills are required to be a Service technician. One of the managers in network 2 who were responsible for recruiting suggested that it was important to recruit people that have some electrical competence, since whatever job the ST will do it requires basic understanding and knowledge of electricity and the safety measures necessary to work with electricity. This manager expressed his excitement about a new educational program that was focused on maintenance and operation. He found the

curriculum of that program to be well suited for the jobs that he was recruiting for and that there has been an obvious lack of this type of education before.

Another manager also in network 2 explained the competence issue in the sector a different way:

What can be said about the competence is that back in the days; one person could walk around in the building and adjust the ventilation a little bit and fix something with some fan and something else, and that was fine. But nowadays things are so incredibly complicated that you rather need someone who is responsible for servicing things, to make sure things get done, not to fix it themselves. Because if something is adjusted in the system it will change some other process, you know recycling of heat and all that stuff. So there is not really a problem to find the competence, the problem is rather to find the competence in one person. You could have one person doing everything before, which is not possible now. This is one of the main reasons why we have changed to the facility management concept.

This understanding of the competence issue explains the large number of professions that are working in a plant room, described in figure 4; a large number of people with different professions need to be involved in the process of maintaining and managing a building.

This manager explained further how it is common to have a function agreement instead of employing people to be in the building during certain hours. The manager gave the following example:

We have an agreement about a function, which means that we are not demanding anyone to be on site two or three times a week. Our agreement is that the ventilation shall function. If it works by them never being there or that they have to be there five times a week is none of our business

This particular property owner employed their own maintenance staff until around 1995 and has since then had different forms of outsourced maintenance of their buildings. The current service deal, with the function agreement had been in place for approximately one year at the time of this study.

The changing needs in the buildings, more advanced systems and larger stores in combination with a management organisation that includes more actors changes the competence demands in the sector. The former one person role of a janitor/maintenance person is now replaced with a number of experts that are rotate between different buildings and perform similar tasks within their expertise in a large number of buildings. The competence requirements for the management personnel have also changed. More actors included in the operations of the buildings require advanced knowledge about contracts and a strong networking capability.

3.6 HOW ABOUT THE SWAN?

All ICA Kvantum and ICA Maxi stores are labelled with the Nordic Swan, which is one of the most recognised environmental labels in Sweden (ICA, 2007). The Nordic swan is used to label a wide range of products and has a special set of criteria for supermarkets, where the supermarket as such is labelled. The criterion covers the entire store, the building structure is one part of the criteria and the sold goods make up the other. The store must fulfil 65% of the criteria, according to a point system, to be labelled with the Nordic swan, i.e. 38 of 57 points. Out of the total 57 points 11 points are directly related to energy consumption in the building and an additional three

to the refrigeration system. Extensive information about the criteria and the points system can be found in (Nordic Ecolabelling Board 2003).

The criteria related to energy consumption in the building include:

- type of lighting in building
- type of electricity used in the building
- control system for ventilation system
- heat recovery for ventilation
- source of energy for heating, and
- reporting energy consumption for heat and electricity

No points are given for low energy consumption, just for which type is used. The example about lights in the fruit and vegetables section of a supermarket in Chapter 3.2.6 hints that the number of lights also is important not just which type of lights. The label is designed so that the store can be certified without fulfilling any of the building related energy consumption criteria, just 11 points out of 57.

All the ICA Kvantum and ICA Maxi stores are labelled as mentioned above, but the awareness about this was low among the Property owners as well as the Service managers and store owners in both networks.

“Well, the buildings are not included in that Swan thing, we are not affected by that, it is up to the stores to obtain a Swan label if they want one. We have our own environmental criteria that we live up to. I believe they are stricter than the Swan label anyway.” – Property owner, network 1

“The Swan labelling might lead to that the stores are more interested in saving energy, they are more aware of the energy costs when they are labelled.” – Property owner, network 2

“The Swan label worked really good in one of the previous stores I owned, we reduced the costs for waste management significantly, I’m sure it might be a good thing for energy as well, I just need to get around to do it.” – Store owner, network 2

There was significant confusion whether or not the buildings were included in the criteria for the Nordic swan label or not. The Nordic swan labelling did not create demand for environmental improvements in the buildings’ energy consumption. I think that the Swan criteria have good intention in shifting the focus from the amount consumed to what is consumed. It does however miss the quantities of energy consumed, which is an essential component in a building’s environmental impact. It also combined the buildings’ environmental impact with those of the activities within the building, which often are separated in the management i.e. property management and retail management.

4 PART III - TWO MODELS FOR UNDERSTANDING THE RELEVANCE BETWEEN THE NATURAL ENVIRONMENT AND ORGANISING

This chapter will present two conceptual models attempting to explain the relationship between organising and the natural environment. These models will be described in depth, but remember they are models in an early development phase. The purpose of these models is to visualise and explain the many links between natural environmental impact and how actors organise their work in the organisational environment. The models can also be seen as a beginning to a theoretical understanding and base for further research on this topic. The models are described in theoretical terms in this chapter, examples of how they can be used are found in the following chapter 4.1.

I will start with one of the models, this model is visualised in figure 5, let's call it model 1. This model describes the connections between the organisational and the natural environment with the interactions as the starting point. The interactions are the connection between the two environments.

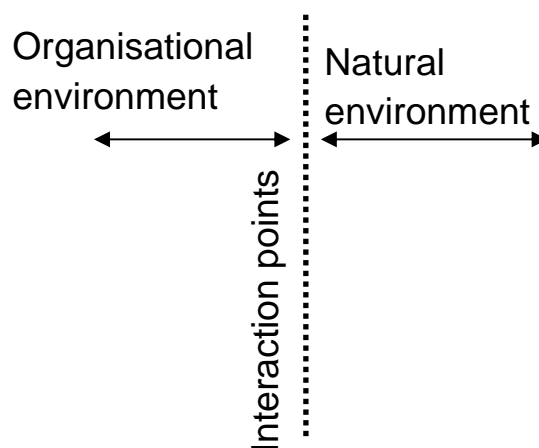


FIGURE 5. THE FIRST CONCEPTUAL MODEL VISUALISED.

I will go through each of the components in the illustration in figure 5 above. First, the dotted line in the middle symbolises interactions, i.e. where the organisational environment meet the natural environment. All interactions cause events to happen along the arrows heading into the organisational and the natural environments. It can also be so that an event occurs in either of the environments, which cause an interaction to happen, hence the double headed arrows. The interactions are in most, if not in all, cases interactions between social networks (i.e. humans) and artefacts (i.e. material things).

Depending on the interaction, the events in the environments are different. Events in the natural environment are, commonly known as, environmental effects. They could be pollution, acidification, climate change etc. The characteristics of these events are often described as cause-

effect chains. This concept is developed to explain or rather predict what would happen to nature if something is released or mixed with something else in the natural environment. These chains can explain the events that would happen in nature if a certain toxic gas is emitted. This is a well-known concept in environmental science.

The events in the organisational environment are well described by Czarniawska (2005) in her model about action-chains and action-nets. The idea is that the interactions lead to actions in network of actors involved in the organising of the (inter)action. These actions could either be reactions on the interaction or decisions made that initiate the interactions. One key element in the theory about action-nets is that these actions not necessarily have to happen within the same organisation or have any formalised action plan. As will be described in the following chapter; it is possible for many organisational entities to be involved in the same interaction.

So far the first model: The second model is illustrated in figure 6 and shall be understood as describing one particular interaction in further depth. This model uses a pipe as a metaphor. Many of the interactions with the natural environment, especially in buildings which this study is focused on, involve some sort of flow. The pipe illustrates a flow, sometimes called an environmental flow and sometimes a media flow. The flow can be for example water, electricity, heat, gas, cooling fluid etcetera. Along the pipe are several control points, where the flow is influenced by actions by people. The flow can be influenced in different ways at the control points, e.g. decreased or increased flow and type of media.

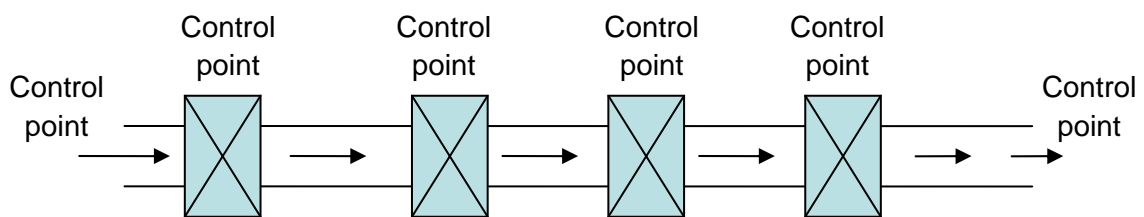


FIGURE 6 THE SECOND MODEL ILLUSTRATED. THE COMPONENTS ARE THE HORIZONTAL PIPE WITH ARROWS SYMBOLISING THE MEDIA FLOW THROUGH THE PIPE, THE CROSSED OUT BOXES SYMBOLISES CONTROL POINTS. THE END USER AND THE INPUT PROVIDER MAY ALSO CONTROL THE FLOW IN THE PIPE, HENCE THE TWO CONTROL POINTS AT EITHER END OF THE PIPE.

The next section 4.1 gives an example of the flow and its control points; the example flow is air flow and heat in a ventilation system in a supermarket. As in the first model this model illustrates the interactions between the organisational and natural environment. The difference between this second model and the first is that this model focuses on one particular interaction; it illustrates the organisational complexity of one single organisational-natural environment interaction.

Both models described in this section are possible to be used in a generic way on a wide range of organisations and activities in society. The pipe does not necessarily need to be a pipe, it can be a conveyor belt, a production chain or even a production flow chart á la life cycle assessment modelling. The interaction diagram in model 1 can be drawn up either on an entity level as will

be done in 4.1 or on a company level or customer level. This is obviously dependent on the unit of analysis and the purpose of the study.

4.1 THE MODELS IN USE

This section will re-tell some of the short stories in chapter 3, but with the difference that the two models, presented in the previous section, will be used to describe them in a way that illustrates the stories relevance to the study of the relationship between the organisational and the natural environments. This section also serves the purpose of illustrating how the models described in the previous section can be used. It is important to note that this report is based on a pilot study, which means that the data might not be as comprehensive as desired in a full study.

I will start by trying to map the stories to the first model. The mapping is focussed on the organisational environment, and described more briefly in the natural environment. Figure 7 illustrates the stories mapped on to the model 1 framework. Three interactions have been mapped on to the conceptual model in the below figures.

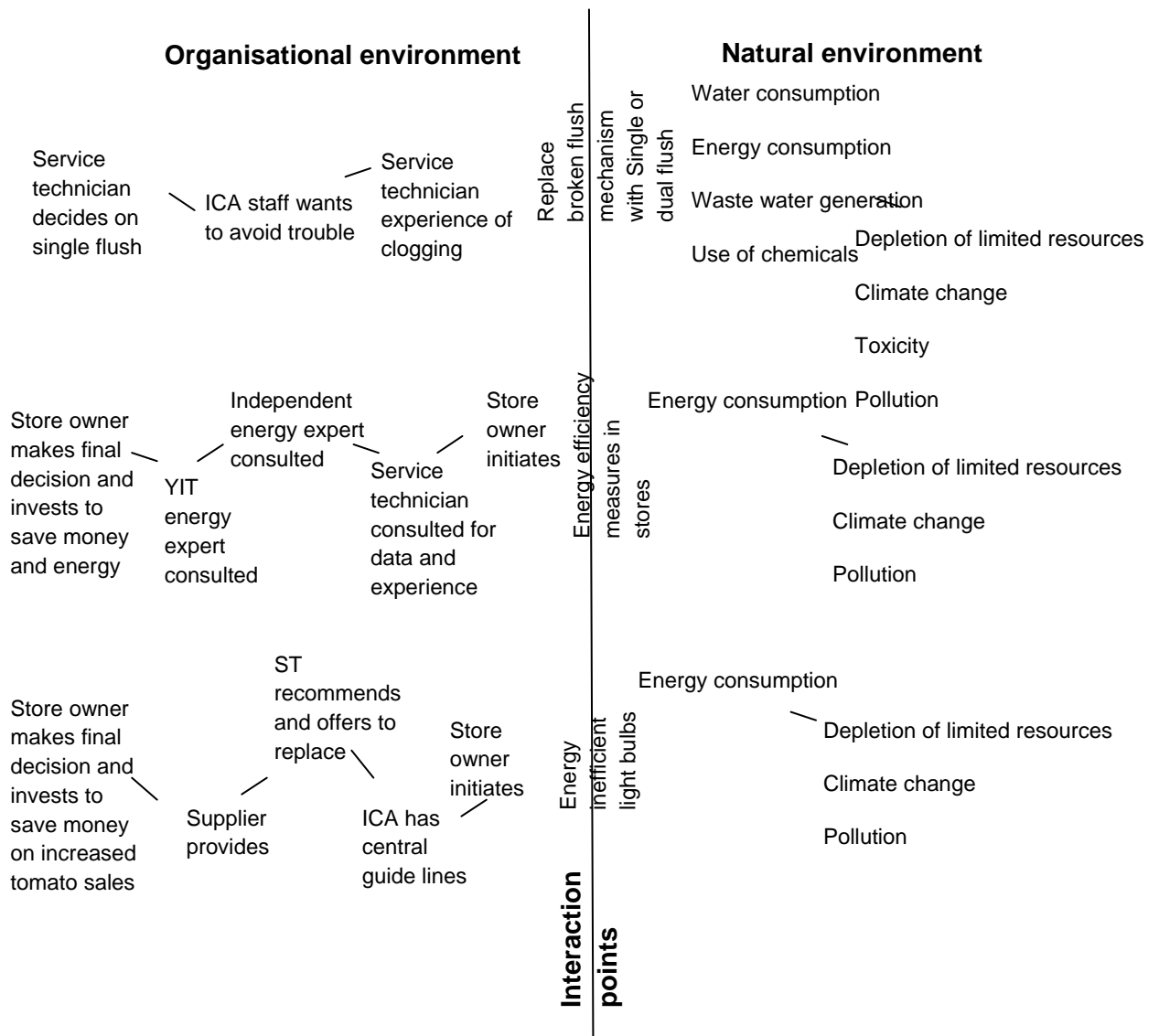


FIGURE 7 MODEL 1 DESCRIBED IN THE SECTION ABOVE HAS BEEN USED TO ILLUSTRATE THREE SITUATIONS FROM THE FIELD IN WHICH THE ORGANISATIONAL ENVIRONMENT INTERACTED WITH THE NATURAL DITTO. NOTE THE VERTICAL TEXT THAT EXPLAINS THE INTERACTION POINTS BETWEEN THE TWO ENVIRONMENTS.

The three interactions in the figure have all been described in the previous sections. The replacement of a toilet's flushing mechanism is described in chapter 3.4, the energy efficiency measures, and the energy efficiency and tomato sales paradox is described in chapter 3.2. I will now describe the reiterate these stories, using the model above as an illustration and concept.

4.2 THE MYSTERY OF DUAL FLUSHING REVISITED

Each time a toilet is flushed the environment is affected. Treated water is being used; energy is consumed to pump the water to fill the tank again as well as for pumping the waste water to a treatment plant. In the plant are chemicals and energy used for treatment. A way to decrease the impact to the environment when flushing a toilet is to fit the toilet with a single or dual flush mechanism. When a mechanism in an existing toilet needs to be replaced, an opportunity for such change appears. When the decision is made about how this toilet shall be refitted is made is also an interaction between the organisation and the environment is present.

The decisions made on this occasion were all made "on the floor" -no executives were involved. The decision making process was pragmatic and based on previous experiences. When the toilet was reported as broken to the ST, they sighed and explained that broken toilets not are very pleasant. After a brief inspection and demounting of the faulty flushing mechanism the STs drove to the plumbing supply store and inquired about this particular mechanism. The STs were presented with the option of a single flush and a dual flush option. They decided to purchase the single flush. The decision was based on their previous experience with many toilets fitted with dual flush mechanisms that had clogged. They expressed that the dual flushing is a great idea, but it is not as reliable as a single flush mechanism. The ICA staff also expressed to the ST the importance of the toilets to be reliable and also how it was extra important since a faulty toilet in a store that sold food is unhygienic and would decrease sales.

There were no incentives for neither the STs nor the ICA staff to chose the (in their opinion) less reliable, but more environmentally sound option for their toilets. There are vaguely expressed policies in the organisations environmental policies that environmental improvements shall be implemented where possible. However on this occasion the top management policy decisions were not strong enough incentive to be efficient. The personal experience and the sheer inconvenience of having to clean up a clogged toilet made the organisation interact with the environment in a way that will cause environment impact on a higher level than necessary.

4.3 THE FIRST STEP TOWARDS ENERGY EFFICIENCY REVISITED

Energy efficiency can be achieved in many ways. However if there is no systematic way of dealing with the issue, some sort of initiation is necessary. An initiation meeting, described in chapter 3.2.8 is such a start. The meeting is also the starting point for a new way of continuous interactions with the environment. A number of actions are necessary to happen for the meeting in the first place and the outcomes of the meeting will trigger a number of other actions.

The meeting was initiated by the ICA store manager's reflections on the increasing energy bill that he had to pay every month. The increase in electricity consumption in his store combined with increasing energy price provided the ICA store manager with larger incentives to work with energy efficiency in his property. He contacted an energy efficiency consultant and called a meeting with the service technicians (STs) that worked in his store. The STs wanted to participate in the meeting since they liked the idea of being involved in an innovative project and because they had incentives from their company to work with energy efficiency with their clients.

The outcomes of the meeting were that the STs would log the temperatures in the building for a month and find out the settings of the ventilations systems more exactly. This procedure would provide them with data about the current state of the property's climate.

The organisational actors included in the network that will perform these tasks are the STs, who are doing the coordination of the logging and the collection of ventilation systems settings. Logging equipment is provided by another section of the ST's company.

The ICA store staff was involved in the process to a limited extent, they would be informed about the logging. One of the reasons for the logging was for the store management to have data to show the store staff about real changes in temperature. The management thought that such data would counter staff's complaints about cold or hot temperature during the trial period that was to come. The ST's previous experience told them that the store staff would complain about cold temperatures if they were told that the temperature is decreased, even though the temperature is kept on the same level. The STs suggested that it would be possible to show the real changes if the temperatures were logged thoroughly.

The role of the external energy consultant, who did not participate in this meeting extended to analysing the data that the STs collect and suggest changes and modifications to the operation of the buildings energy consuming systems. The consultant is an external person who mainly will be in contact with the ICA store manager. The consultant's role is important in the sense that the quality of his suggestions will determine the success of the project.

However, it is the ICA store manager that will make decisions about how the operations of the store will change. The ICA store manager also finances the changes and the process. Since he believed that this project would decrease the costs of operating the store in the long run, he suggested that it is only fair that he is the one who finances the investments and the process. So, the ICA store manager is making the executive decisions and is also funding the project.

The manager did however suggest that ICA Properties had to be informed about major changes in the structure and also in the operation of the systems in the building. They are the owners of the building and much of the equipment after all. They might also be approached for additional funding if the suggestions from the energy consultant involve major alterations to the building, which implies major investments and physical changes to the building.

4.4 COMPARING TOMATOES TO KILOWATTS REVISITED

A large number of high energy consuming lights were used in the fruit and vegetable department in one store. The store manager is of the opinion that such lights are effective in the sense that they make the vegetables look more attractive in their displays. The background to the use of the lights is that a water sprinkling system that was used a few years ago has been prohibited for

health reasons. The light is another method to make the vegetables look more fresh and appealing to the customers.

The installation of the lights was initiated by the store manager, however the central ICA organisation had guidelines about the lights, and a certain model was recommended. The STs were contracted to purchase and install the equipment. The ST gave recommendations on which type and how many, since they have been involved in similar situations before. A lighting supplier delivered them. The STs installed the equipment. It is the ICA store manager that decides if he wants the lights or not. He is the one making the comparison between the potentially increased vegetable sales and the extra cost in energy consumption and the increased emissions of greenhouse gases and other pollutants associated with increased energy consumption.

4.5 AN ORGANISATIONAL DESCRIPTION OF A VENTILATION SYSTEM

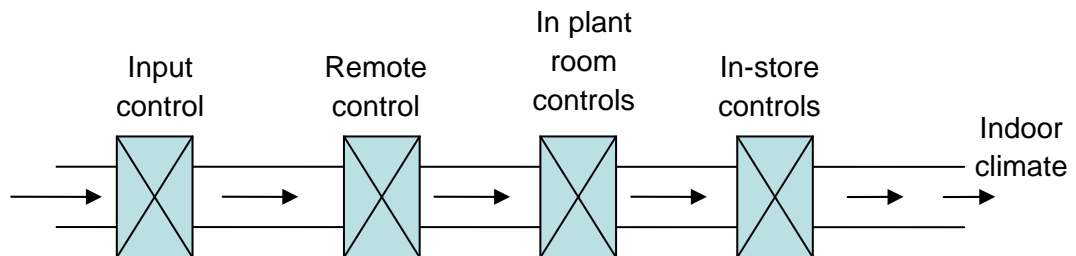


FIGURE 8. THE MODEL DESCRIBED IN THE PREVIOUS CHAPTER HAS BEEN USED TO ILLUSTRATE THE ORGANISATIONAL SIDE OF OPERATION OF A VENTILATION SYSTEM.

A ventilation system in one of the stores was controlled in many places; the same system is described in 3.2.9. The different control points are illustrated in figure 8 above. I participated in the repair of a broken part in the system and got insights in the organisational part of the operation of the ventilation system. I will explain the organisational operations of the system by using an occasion when the system failed. That example will illustrate how the organisational response to an event really happens, at least in this case. I will refer to the picture in the brackets.

The indoor air in the store was not good, so the staff made a complaint (Indoor climate). The ventilation system failed while chicken was being grilled. The staff tried to use the forced ventilation, but it did not help, it was broken (In-store controls). The store was filled with smoke and smelt like grilled chicken. The complaint was made and the STs went in to the plant room and started to run checks on the system. Most of the checks were done by controlling levers to see if the doors and fans were OK, mainly by listening or feeling. They also logged on to the computer and did some check there (In plant room controls). However they were not successful, they concluded that the system not was working properly, but were not able to establish what the cause of the problem was. They called the company that was responsible for the support of the systems. This company was located elsewhere. They were able to locate the problem over the telephone. The person on the other end of the phone instructed the ST and the ST reported what happened to the system. The support person could also adjust the system from his position

(Remote control). They located the problem and came up with a solution together. The STs replaced the broken part with a new and the system worked again.

I will continue this description by explaining how the consumption of energy in the HVAC system is controlled. I will use similar references as in the previous section. The environmental impact from energy consumption is decided by the quantity consumed in combination with which type of energy that is consumed. Some might argue that the location of the consumption is important as well, but that is disregarded in this case because the store is very static in its location.

The quantity of air and energy is controlled by a combination of controls. I will go through them one by one, they add up to the total. The purpose of the ventilation system is to provide a certain indoor climate. Depending on the outdoor climate, the number of people in the store (people produce heat), the amount of deliveries and so on (it is necessary to open the doors to receive deliveries), the amount of energy needed to meet the indoor climate requirements varies. These factors are controlled by a range of factors, some very difficult, if at all possible to control by the humans. However the level of acceptance in variations in the indoor climate is something that is controlled by the users of the building.

The flow of air can also be controlled by switches in the store. The staffs have access to for example force ventilation and additional heating in some places. These controls are located in the store and are a part of the control of the quantity. Furthermore, adjustments can be made in the plant rooms. The temperature can be increased or decreased; the operating times of the systems can be adjusted, longer or shorter. The allowed variations in temperature can be changed. These controls have effect on the quantity and are generally controlled by the maintenance staff on order by store manager or facility manager.

As mentioned before, the ventilations systems can also be controlled remotely. Controls similar to those that can be made in the plant room can be made remotely. A consultancy that provides service and support is usually in charge of these controls. The controls can be accessed all day, all year. The decisions to change these remote controls are usually made by a representative from the property owner together with the consultancy.

The input control in figure 8 above is controlled by the supply of energy and electricity. The procurement of electricity and heat in conjunction with the supplier's range of energy and electricity available determines the input to the system and its impact on the environment. Electricity was procured by the ICA store manager, either by himself or with the assistance from ICA Properties centrally. The type of electricity that is purchased has a major impact on the environmental performance of the ventilation system. Electricity can be produced in many different ways. It can generally be said that when the electricity is produced from renewable sources it has less environmental impact than if it is produced from a non-renewable. The decision about which type of electricity to buy was made by the store manager if procuring electricity on his own, that decision was made together with the procurement department at ICA if procured together with them.

The heat that is supplied to the system is controlled by the type of equipment that is installed in the building, a decision that often is made during construction or renovation of the building. There are a number of different ways to heat these buildings; a method that is common in

Göteborg is district heating, which was used in the ICA stores I studied. The supplier has a lot of control of which sources the heat for the district heating comes from. The customer cannot specify which type of district heat that is delivered to their system. The renovation and construction of buildings are crucial for the control of which environmental load the heat will have. Also if additional heat supplies are needed in the building, the fuel for them can be controlled during procurement. The supplier of heat to the district heating system is generally a large municipality owned energy company. The environmental load from the energy supplied by such a company could perhaps be influenced by the political leadership in the region and by changing customer demand. However the supply is determined by the existing infrastructure for energy generation.

The environmental impact from the flow in the ventilation system is controlled by several organisations and decision makers. The model illustrated in the figure 8 above shows how these organisations can be mapped alongside with the flow of the energy for the ventilation system. Improvements in the environmental impact of the ventilation system can be done easily at one control; however it is important to notice that what is done in one control might affect what is happening in another control and the actor managing that control might make a contra-reaction that levels out the improvement that was done in the first place. Cooperation and understanding of the bigger picture seems to be the way forward for environmental improvements in technical systems that have a complex organisational network associated with them.

5 HOW CHANGE MIGHT COME ABOUT

The networks, the actions, the events, can be described in different ways, depending on how they are perceived by the observer. I focussed on the actions, the relations between the actions and the interactions between the environment and these actions. I presented two models for illustrating these relations in the previous chapter. Suggestions about how the action-nets should be manipulated to achieve environmental improvements could perhaps be made based on those models. An alternative view on the networks is to focus on the events rather than the actions. System theory is based on events and mechanisms triggering or initiating events. This chapter processes the information from the field studies in a system theory light. Donella Meadows pragmatic thoughts about change are the basis for this endeavour in to a slice of systems theory.

Donella Meadows (1997; 1999) writes about how change can be created in complex systems in terms of leverage points. She identifies 12 leverage points where systems can be intervened effectively. The Sustainability Institute¹ (2001) elaborated on the leverage points and created a metaphor based on an iceberg to illustrate the leverage points and their influence on change, see figure 6. The iceberg is chosen as a metaphor since the events illustrated above the surface are visible symptoms of the situation, but what causes these events on the tip of the iceberg is not visible, but most important.

Abey Suriya (2007 (forthcoming)) explains the meanings of the four sections of the iceberg as Events being the visible symptoms of a problematic situation including events, issues and trends. She explains Patterns of behaviour as the human practices that give rise to the events. The systemic structures are described as structures that create the patterns of behaviours in the previous point, including historical, cultural, technological, economic, institutional and political structures. At last, she identifies Mindsets as the paradigms, mindsets and worldviews that underpin and carry the entire structure.

¹ Founded by Donella Meadows

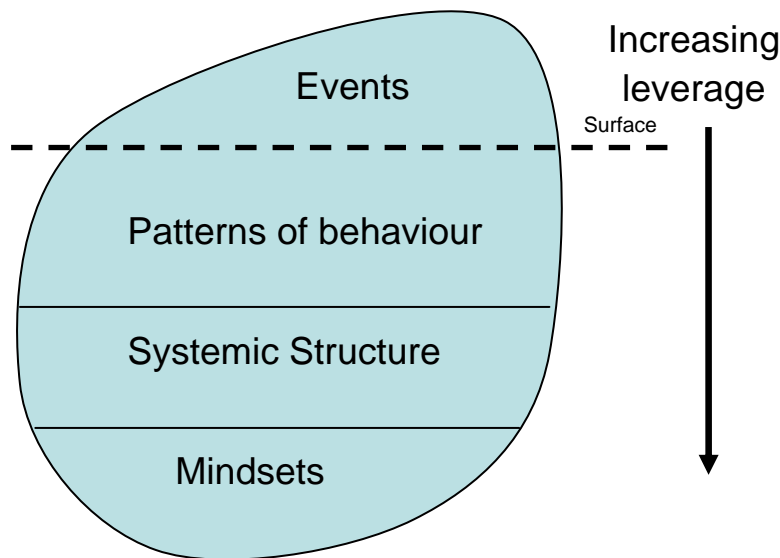


FIGURE 9 DONELLA MEADOW'S ICEBERG THAT ILLUSTRATES WHERE AND HOW INTERVENTION FOR CHANGE CAN HAPPEN. FROM (SUSTAINABILITY INSTITUTE 2001)

I will map some of my findings from the ICA study to the iceberg model of change creation and understanding of how events appear. The mapping represents examples of findings; all environmental impacts are not included. I attempt to describe how changes might be possible to create in each of the sections of the iceberg. As the figure illustrates are the influence of the changes stronger the further down in the iceberg changes are created.

5.1 EVENTS

Operating times for ventilation systems, desired temperatures, types of light systems etc. are examples of events that have environmental impact in the buildings. Changes to these events can be created by pricing, subsidies, taxes and/or standards. The spotlights discussed Comparing kilowatts to tomatoes were tested, standardised and recommended by a central ICA body. The store managers that were interested in them were encouraged to purchase them. The spotlights in the stores that have these lights would change if the ICA standard was changed.

Another example is how the government can legislate about certain environmental impacts in buildings. An example of this relevant to these buildings is how Freons were prohibited as cooling media. These substances have been removed from the buildings' air-conditioning and refrigeration systems.

5.2 PATTERNS OF BEHAVIOUR

The human practices in this system are illustrated by the energy efficiency meetings that the facility management company arranged described in chapter 3.2.9 where just the property owners and not the tenants were invited. The company was aware that these meeting weren't particularly effective but continued to host them.

The attitude and practices among the service staff was that they preferred to go about things the way they always done. It would for example be great if the computerised systems, discussed in

chapter 3.2.5 could be fixed by using a screwdriver instead of learning about computers. The pattern of behaviour that I could notice during the study was that it was preferred to continue to go about the operation of the buildings in a manner similar to what always been done.

However change was created to this pattern when one of the store managers intervened and called a meeting to discuss how the events in the building could change to become more energy efficient. This meeting is described in more detail in chapter 3.2.8 called the first step towards energy efficiency. The meeting was a change in the human behaviour and will create changes to the events in the buildings.

5.3 SYSTEMIC STRUCTURE

As mentioned several times in the report is the financial structure of the system a barrier for motivating energy efficient measures in the system since the actor investing in energy efficient equipment not necessarily is the same as the actor that will reap the benefits in form of lower energy costs. This is a systemic structure that is a barrier to energy efficiency in buildings.

Change can come about by intervening in this system by for example changing the lease agreements. Tim Power (2004) suggests a framework for green leases where the landlord and the tenant share the responsibility for the environmental performance of the buildings as well as the financial burdens and benefits of the environmental improvements. A measurable environmental target is negotiated in the lease contract. Responsibilities and penalties for not fulfilling the agreements are also negotiated. As an example; rent can be reduced if the landlord fails to deliver a building that delivers specified energy consumption. The rent is reduced the amount equivalent to the additional cost for higher energy use than specified. The tenant's obligations could include following a specified environmental management system for the use of the building. Several good suggestions of green initiatives that both the tenant and the landlord could commit to are given in the Green lease guide published by the Investa property group (Investa Property Group 2006). One example is to install smart meters in key energy consuming locations in the buildings, so that the tenants easier can monitor their consumption, another is to cooperate when offices are refurbished and are changing use.

Changing the systematic structure by renegotiating the contractual agreements is a leverage point that has potential for significant change to the environmental performance in buildings. This barrier was often mentioned in the study as important. Donella Meadows starts her 1999 article by quoting the MIT professor Jay W. Forrester:

People know intuitively where leverage points are. Time after time I've done an analysis of a company, and I've figured out a leverage point – in inventory policy maybe, or in relationship between sales force and productive force, or in personnel policy. Then I've gone to the company and discovered that there's already a lot of attention to that point. Everyone is trying very hard to push it in the wrong direction!

When reflecting on my findings, I agree with Forrester in the sense that I had identified the contractual and financial arrangements to be barriers to energy efficient investments, see Lundberg and Baumann (2005) for details. The people in the system were very well aware of this leverage point. Forrester is also right in the sense that the actors in the system are working very hard to push this point in the wrong direction, the ICA Properties are continuing to outsource

their management, and new contracts were signed and ready to be effective during the study. The facility manager continued to outsource services and let the Service technicians continue to procure services and goods without any environmental policy, more ventilation systems are installed and more actors are being involved in the management of the buildings.

The leverage point is pushed in the wrong direction by creating even more complex incentives structures and including more actors that are acting independently without policy guidance.

5.4 MINDSETS/PARADIGMS

The mindset present in the studied system is that energy savings should save money in the short term and that the environmental benefits from energy saving is secondary.

This mindset acts as a barrier to alternative energy sources, which still are more expensive than the conventional energy sources. It is generally more expensive to buy green electricity than conventional and local investments in on-site energy generation, such as solar panels and local wind mills are not yet financially competitive in the short-term with the option of purchasing conventionally generated electricity.

Short term financial savings are expected from energy efficiency measures. When the energy efficiency measures not offer financial savings, the measures are usually not done. This mindset stops the long term investments and investments in projects where expected savings not can be quantified in financial terms, for example behaviour change and awareness projects.

Meadows (1997) explain how paradigms could change:

You could say paradigms are harder to change than anything else about the system, but there is nothing physical or expensive or even slow about paradigm change. In a single individual it can happen in a millisecond. All it takes is a click in the mind, a new way of seeing. Of course individuals and societies do resist challenges to their paradigm harder than they resist any other change.

There is an important challenge in this system to promote a change in peoples' paradigms and mindsets about environmental improvements. How to go about doing that is a challenging topic for another essay.

6 LESSONS LEARNT FOR FUTURE STUDIES

This chapter is intended to be a guide for future studies in this field. I will reflect on the method used, the limitations of the study and what might be interesting topics to focus on in following studies.

The study was intended to be a pilot study conducted under a limited time with limited resources. The data collected is obviously also limited to some extent. However collecting data for a pilot study was somewhat overwhelming, many impressions, many notes, many recorded interviews. I suggest when conducting a larger study that determining a structured method for data recording. The data in the pilot study was manageable but I believe that an up-scaled version of this study would generate an extensive quantity of data and that a structured and well thought out strategy for recording data would ease the researcher's job significantly.

I also suggest taking breaks during the observations, reflection time is necessary during the observation. The breaks can be used for taking notes and most important to allow getting some distance from the studied persons. Reflections about the research questions and the scope for of the study are recommended during these breaks. I believe this would be a good method to be able to understand during the observations what is relevant and what is less relevant or irrelevant.

A further suggestion is to conduct a number of preliminary interviews with key people in the organisations to understand the business and the structure in which it is working. Some lingo may also be learnt during such interviews. It would be a good idea to review or rather design the study after these interviews so that the study is relevant and feasible. I recommend talking to some senior manager as well as a person a bit closer to the operations, maybe also in more organisations than the main one that is being studied. It is also important to talk to the CEO of the company, so that he/she is supporting your study. It is a great advantage to be able to use the CEO's name when asking for interview time or permission to follow a person for participant observation.

With regards to the study design, I believe that it may be better to focus on the management of one or two appliances in a building rather than attempting to study the management of an entire building. If the study is designed in that manner it will be sharper and have a clearer focus. The content of the study would be less extensive, but the data collection will be easier and the relevance of the data collected would be also eased. During my study it was sometimes difficult to not be overwhelmed by the complexity of a buildings construction, design, the management of it and its environmental impact. It is a thorough task to study all these aspect of such a large object. Hence I suggest that focussing on one appliance or maybe two, or even a group of appliances would be a more comprehensible task, for the researcher as well as for the benefit of the research goals within the EAO framework. The links between the management and the environment could be more extensively examined and more sophisticated conclusions could be drawn from the study. My study shows that the management of a ventilation system has numerous actors and interesting paradoxes that could be examined in more detail. A system like the ventilation system or the refrigeration system would be suitable for further investigation to how the environment is affected by the management.

Another lesson learnt is that the participant observations were really helpful in getting unique data sets. The observations required devotion and time from the researcher. The efforts were however rewarding and the data that was collected from this exercise is really valuable. The observation provided opportunity to observe the actual actions and opinions of the people that were studied. The setting was much more relaxed than during an interview setting. The time was also longer. I believe that the studied people liked being in “their” environment i.e. their regular work setting rather than in an interviewing situation. I conducted participant observation on the blue collar workers in the networks; I suggest that doing the same with the people in management positions could provide interesting data sets. I am not convinced that it can replace interviews but I am certain they would be a great compliment to the data from the interviews. During the interviews I felt that most of the managers in this industry have made their way to a management position by working their way up through their position. Most of them had an air about them that seemed that they were more about doing than talking about doing. This is why I believe that the participant observations would be a good method to collect data from managers as well as workers.

A range of different environmental issues are discussed in the study; however the energy issue is described in more depth throughout the report. I believe that one of the main reasons for that was the hype of the energy issue that was happening at the time of the interview. I also believe that my description of the field is accurate in the way that energy savings is the environmental issue with the most focus in this industry at the moment. I do not think that my selection of study objects caused this skewed focus on the environmental issues. However, there might have been more data about the other environmental issues if I stayed in the field for an extended time.

I made more observations in network 2 than in network 1; I had more data from observations and interviews in network 2. One of the reasons for this was access to data. The result from the study was affected in the way that there was more representation of the how network 2 function.

Another effect from this is that a comparison between the two networks not was possible to its full extent; however I do suggest that a significantly larger dataset would be needed from both of the networks would be needed for a meaningful comparison between networks like these.

7 CONCLUSION OF RESULTS

The management of large retail buildings is usually organised through service agreements, the owner of the building contracts a company to service the building. The service agreement states which services are included and how the building shall function. It is the up to the service provider to use which ever strategy to make this happen as long as the building functions according to the agreement. The service provider usually procures some of the services and provides some of them with their own personnel. A key person in the service of the buildings is the Service technician, who spend time in the building doing smaller repairs and is the contact person for the tenants. The Service technician is arranging repairs and maintenance in the buildings as well as keeping good relations with tenants.

The strategies for managing buildings used for supermarkets influences the environmental performance of the buildings in several ways. The most frequent observation is how the complex owner and tenant structure is problematic for promoting energy efficiency measures with financial motivations. The complex tenant and owner structure also restrains the possibilities of achieving a holistic view and approach. This view would increase the possibilities to take the environmental improvements opportunities that exist in buildings. Another influence is how energy efficiency is seen as a way to save money only, the environmental reasons are merely token reasons, this hinders investments in alternative energy sources as long as these not are more cost efficient in the short term than conventional energy sources. There are numerous ways in which actions in the organisational environment influence the performance in the natural environment, however it is difficult to quantify as well as to qualify which action in one environment leads to what action in the other environment. However the interaction point concept is helpful in the description of the ways the environments influence each other. The interaction points where developed within the realms of this pilot project and this concept was helpful in thinking about and explaining how the environments are linked, but also in illustrating these links.

The qualitative research methods and tools provided extensive and valuable data. The tools were rewarding to use, it was a strong learning curve for the investigator, and the efforts put it paid off in a valuable and original dataset. The potential for future use of tools such as the Participant observation is great. The data collected by using this tool is unique and provides the investigator with a deep understanding of the situation which is impossible to get from interviews or surveys.

8 REFERENCES

- Abey Suriya, Kumudini (2007) *Sustainable urban sanitation in developing Asian countries*. Institute for Sustainable Futures Sydney, University of Technology, Sydney, Doctoral
- Adalberth, Karin (2000) *Energy Use and Environmental Impact of New Residential Buildings*. Department of Building Physics Lund, Lund Institute of Technology, Doctoral
- Baumann, Henrikke (2004) *Environmental assessment of organising: towards a framework for the study of organisational influence on environmental performance*. Progress in Industrial Ecology 1 (1/2/3): 292-306.
- Baumann, Henrikke, Birgit Brunklaus, Pernilla Gluch, Anna Kadefors, Ann-Charlotte Stenberg and Liane Thuvander (2003) *Miljöbarometern för byggsektorn 2002 (In English: Environmental barometer for the building sector)* Chalmers, ESA Göteborg
- Brand, Stewart (1994) *How buildings learn - What happens after they're built*. London, Viking.
- Brunklaus, Birgit (2005) *Organisational Background to environmental impacts: Field study on housing management in Gothenburg*. Environmental Systems Analysis Göteborg, Licentiate engineering thesis Chalmers University of Technology,
- Charmaz, Kathy (2006) *Constructing Grounded Theory - A Practical Guide Through Qualitative Analysis*. London, Sage Publications.
- Cordell, Dana, Denise Day, Geoff Milne, James Robinson, Kaarina Sarac and Stuart White (2002) *Melbourne end use and water consumption influences study - End use data and analysis* Institute for Sustainable futures, University of Technology, Sydney Sydney, Australia
- Cushing, Frank Hamilton and Jesse Green (1979) *Zuni: selected writings of Frank Hamilton* Cushing, University of Nebraska Press.
- Czarniawska, Barbara (2005) *En teori om organiserings*. Lund, Studentlitteratur.
- Deal, Terrence E. and Allan A. Kennedy (1982) *Corporate Cultures. The rites and rituals of corporate life*. London, Perseus Books Publishing.
- Dewalt, Kathleen and Billie Dewalt (2002) *Participant Observation: A Guide for Fieldworkers*. Walnut Creek, California, AltaMira Press.
- Femenias, Paula (2004) *Demonstration projects for sustainable buildings*. School of Architecture Gothenburg, Chalmers University of technology, Doctoral
- Glaser, Barney (1978) *Theoretical Sensitivity*. Mill Valley, California, Sociology Press.
- Glaser, Barney (1998) *Doing grounded theory*. Mill Valley, California, Sociology Press.
- Gluch, Pernilla (2005) *Building Green Perspectives on Environmental Management in Construction*. Building Economics and Management Göteborg, Chalmers University of Technology, Doctoral thesis

Gluch, Pernilla, Birgit Brunklaus, Karin Johansson, Örjan Lundberg, Ann-Charlotte Stenberg and Liane Thuvander (2007) *Miljöbarometern för bygg- och fastighetssektorn 2006: En kartläggning av sektorns miljöarbete. In English: The Environmental Barometer for the construction and property sector 2006* Chalmers tekniska högskola Göteborg CMB rapport

Gold, Raymond (1958) *Roles in Sociological Field Observations*. Social Forces 36 (3): 217-223.

Goodrick, Delwyn (2007) *Qualitative Research: Design, Analysis and Representation*. ACSPRI Workshop Notes, Canberra, Australia.

Holm, Fredrik and Gunnar Persson (1998) *Gröna Kåkboken (In English: The green house book)*, SABO, SNF.

ICA. (2007) "About us ICA Sverige AB." Accessed 2007-03-22.

ICA (2007) *ICA Annual Report 2006* Västerås

Investa Property Group (2006) *Green lease guide for commercial office tenants* Sydney

IPCC (2001) *Climate Change 2001: Mitigation Intergovernmental panel on climate change* WMO UNEP

Jackson, Peter (1983) *Principles and Problems of Participant Observation* Geografiska Annaler Series B 65 (1): 39-46.

Junker, Buford (1952) *Some Suggestions for the Design of Field Work Learning Experiences* In E. C. Hughes Cases on Field Work, The University of Chicago.

Kawulich, Barbara (2005) *Participant Observation as a data collection method* Forum: Qualitative Social Research 6 (2).

Kluchohn, Florence (1940) *The Participant-Observation technique in Small Communities*. The American Journal of Sociology 46 (3): 331-343.

Koomey, J. G., M. D. Levine, N. C. Martin, L. K. Price, M. Brown, G. Courville, M. Macdonald, J. Tomlinson, J. Van Coevering and R. Wendt (1997) *Potential for energy-efficient technologies to reduce carbon emissions in the United States: buildings sector*, Honolulu, HI, USA, IEEE, Piscataway, NJ, USA.

Kvale, Steinar (1997) *Den kvalitativa forskningsintervjun*. Lund, Studentlitteratur.

Lundberg, Örjan (2007) *The Property Sector and the Environment* Chalmers Göteborg ESA report

Lundberg, Örjan and Henrikke Baumann (2005) *Environmental implications of a structural change in the commercial property sector*. Business Strategy and the Environment, Leeds, United Kingdom.

Meadows, Donella (1997) *Places to intervene in a System*. Whole Earth (Winter 1997).

Meadows, Donella (1999) *Leverage points - places to intervene in a system*. Sustainability Institute.

Nordic Ecolabelling Board (2003) *Ecolabelling of Supernarkets/Grocery stores* 15 June 2003 - 15 June 2008 Charlottenlund, Denmark

Nässén, Jonas (2005) *Energy efficiency and the challenge of climate change - Studies of the Swedish building sector*. Physical Resource Theory Department of Energy and Environment Göteborg, Chalmers University of Technology,

Patton, Michael Quinn (2002) *Qualitative Research & Evaluation Methods*. Thousand Oaks, California, Sage Publications.

Persson, Agneta (2002) *Energianvändning i bebyggelsen (in English: Energy use in buildings)* Royal Swedish Academy of Engineering Sciences, IVA Stockholm

Power, Tim (2004) *Lease arrangement for green commercial buildings*. Green Buildings Conference, Sydney, Australia, 28 April 2004.

Steen, P., T.B. Johansson, R. Fredriksson and E. Bogren (1981) *Energi - till vad och hur mycket? (In English: Energy - for what? and how much?)*. Stockholm, Framtidsbilder, Liber.

Stenberg, Jenny and Liane Thuvander (2005) *Att länka miljöeffekter och sociala effekter - en utvärdering av LIP-finansierade bostadsförnyelseprojekt (In English: Linking Environmental and Social Effects - an evaluation of LIP-financed residential renovation projects)*. Stockholm, Naturvårdsverket.

Stern, Phyllis, Ed. (1994) *Eroding Grounded Theory. Critical Issues in Qualitative research Methods*. Thousand Oaks, California, Sage Publications.

Strauss, Anselm and Juliet Corbin (1990) *Basics of Qualitative Research - Grounded Theory Procedures and Techniques*. London, Sage Publications.

Sustainability Institute (2001) *Foundation Dynamics: Exploring the leverage points for successfully funding sustainability*.

Swedish Environmental Advisory Board (2004) *Energieffektiv bebyggelse - Underlag för Miljövårdsberedningens diskussion (In English: Energy efficient buildings - basis for the advisory board's discussion)* Statens Offentliga Utredningar Stockholm

Swedish Environmental Protection Agency (2003) *Building, living and property management for the future* Stockholm

The Swedish Council for Building Research (1996) *The Energy Book - A résumé of present knowledge and research*. Stockholm, Swedish council for building research.

Thormark, Catarina (2001) *Recycling Potential and Design for Disassembly in Buildings*. Division of Building Science Department of Construction and Architecture Lund, Lund Institute of Technology, Doctoral

Thuvander, Liane (2004) *Byggande för en hållbar utveckling i Göteborg - 10 exempel. In English: Construction for Sustainable development in Göteborg - 10 examples* Chalmers Arkitektur, Tema Byggd miljö & hållbar utveckling Göteborg

Unep (2003) *Sustainable buildings and construction: facts and figures*. Industry and environment 26 (2-3): 5-8.

Vinten, Gerald (1994) *Participant Observation: A Model for Organizational Investigation?* Journal of Managerial Psychology 9 (2): 30-38.

Young, Michael (2004) *Malinowski: Odyssey of an Anthropologist, 1884-1920*, Yale University Press.